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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLXV. No. 3172.] LONDON, FEBRUARY 27, 1924. [76th Year. Price 1s.

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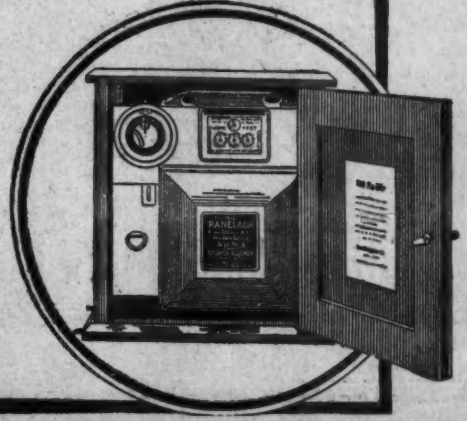

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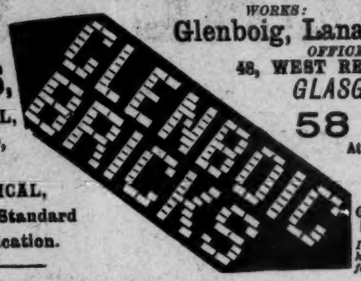

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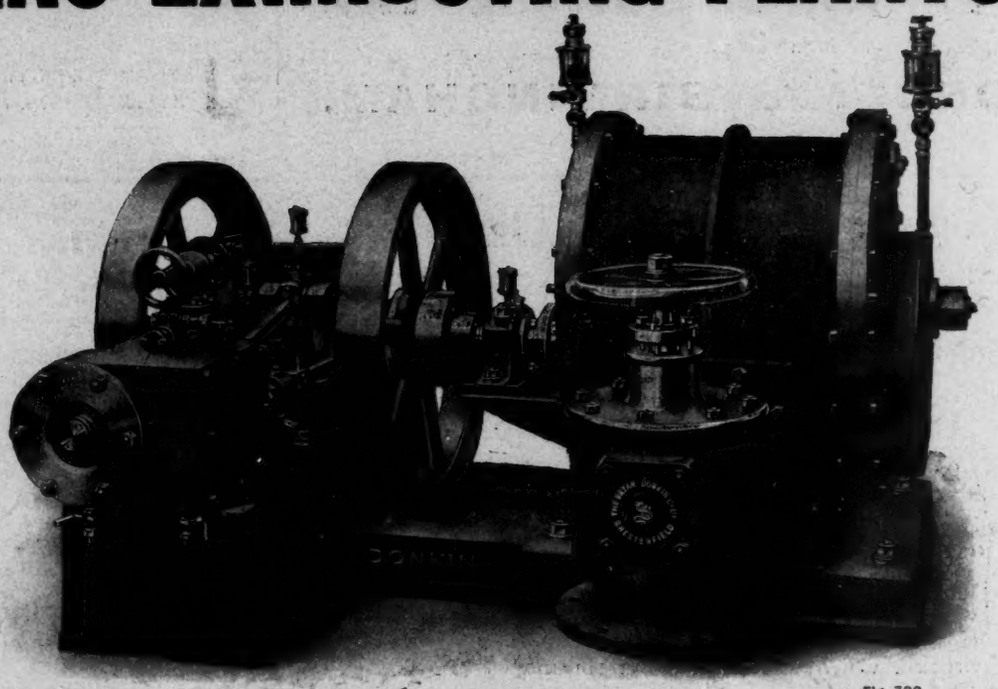

Fig. 732.

Gas Exhauster coupled direct to Horizontal Steam Engine (C Type) combined on the same cast-iron baseplate.

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VOL. CLXV., No. 3172.] WEDNESDAY, FEBRUARY 27, 1924. [76TH YEAR.

EDITORIAL NOTES.

The Therm in Coal Distillation.

THE Cantor Lectures which Mr. E. V. Evans, O.B.E., F.I.C., the Chief Chemist and Products Manager of the South Metropolitan Gas Company, is delivering at the Society of Arts, we venture to predict, will—if the succeeding two are (as we are sure they will be) on the same plane as the first, published this week—be highly valuable to the gas industry. They will give us the results of the intimate study of the process of coal carbonization which the lecturer has been able to make at the works of the South Metropolitan Gas Company; and they promise to be the means of inducing coal carbonizers to study, and to interpret the results of, every carbonization process from the thermal point of view. When the distribution of the original thermal energy of the coal in the various products arising from different carbonization processes is ascertained and can be compared in equal terms, then we have a valuable and reliable guide to assist determination as to the line of operations to pursue in any given circumstances. Mr. Evans is a student, a worker, and an applier of science to practice; and his lectures, we are confident, will open up fresh avenues of thought, and lead to investigations of results which will be of the utmost importance in promoting the efficiency of the basic process in the industry's large and varied activities. The lectures indeed may be a turning-point in this regard. At all events, that is obviously one of the things wh ch Mr. Evans aspires by them to promote.

The point is well illustrated in the opening part of the first lecture; and on the present occasion it is to this that we will confine attention. There is no question that the therm is growing rapidly in popularity among technical men engaged in the carbonizing industries. There is a usefulness about it which, unrecognized at first, now fascinates; and the extension of its application will enable a considerable expansion to be made in our knowledge of the results of work wherever carried out. Hitherto, in the presentation of results, there has been no common method which enabled data from experimental or ordinary work in one place to be compared with those from another with the exactitude which is so desirable to realize true progress. But with the therm there is no reason why a system of presenting results should not be developed which will enable them to be properly interpreted, no matter from whom or whence they emanate. And Mr. Evans urges that the data should not only apply to the primary product, but to the secondary ones. If this be done, then there can be a proper determination, in any set of circumstances, of the distribution of the original thermal value of the coal, and of the loss incurred in the process. In fact, he appeals to gas men to agree that in the interests of their main product—coal gas—they should devote the utmost attention to all subsidiary products. Here he makes a point which we have often urged, but which has largely been neglected, because it was not in conformity with the traditional nomenclature of our industry, The commercial value to gas undertakings of the secondary products of coal carbonization, and the important part they have in fixing the price of gas, have led us more than once to suggest that the belittling title of "residuals" should be discarded, and "secondary products" be applied. Mr. Evans now extends previously presented reasons for an appropriate designation, in saying: "When "it is generally realized that these subsidiary products are "sources of potential therms, they will be placed in a posi- "tion only just second to that of gas, and the word 're- "sidual' will, it is hoped, entirely disappear from our indus- "trial vocabulary, and be replaced by 'bye-products.'"

The thermal assessment is applied by the lecturer to the products of the high and the low temperature systems of carbonization; and the result of this presentation of the distribution in the products of the thermal energy contained in the original coal is highly enlightening. The simple illustration at once shows the value of the thermal interpretation of results. We have, of course, always first to keep an eye on the main purpose of any carbonization process; but commercial considerations suggest that the true relationship of the secondary products should not be overlooked, and that the most economic balance should be maintained. In discussing the question of low-temperature carbonization, gas makers airily dismiss the subject by saying: "Foremost we are sellers of gas." That is true; it is also obvious; but it is not enough. An examination of the thermal results of the two processes, as Mr. Evans shows, gives us something much more solid upon which to take our stand in defence of present practices. His experience has been largely with the making of coal gas from horizontal retorts; and this has to be remembered in considering the high-temperature figures presented. For high-temperature carbonization, without the admission of steam, a ton of coal containing 300 therms will yield about 72 therms of gas (560 B.Th.U. per c.ft.), some 17 therms of tar, and 199 therms of coke. Adding these figures together, we have 288 therms of the original 300 in the form of products, so that there has been a loss of 12 therms in the process of high-temperature carbonization. This is not at all surprising when it is realized that the whole of the heat required for the work is not transmitted through the walls of the retort, but is partly supplied from the coal undergoing carbonization. Carbonizing from the same sample of coal at low temperature, 35 therms of gas were obtained (1090 B.Th.U. per c.ft.), 26 therms of tar, and 223 therms of coke. Adding these figures together, we have 284 therms, so that in this case there has been a loss in the process of 16 therms—4 therms more than in the case of high-temperature carbonization. From the efficiency point of view, there is thus little difference between the processes; but such difference as exists, is in favour of the high-temperature system. Here we have an effectual answer to the superior efficiency claims of certain low-temperature advocates.

Again, just glance for a moment at the distribution of the therms in the products. This is extremely interesting from the coal carbonizer's point of view, and well illustrates, though we are in a sense comparing extremes, the value of securing complete therm distribution data in all carbonizing processes. First, there is the well-known difference in the therms of gas—in this instance, no less than 37 therms; and we find that of these some 33 therms are—at any rate from the town-gas maker's point of view—misplaced therms. Through carbonizing at low temperature, 9 of them have gone into the tar, and 24 into the coke. Therefore, as Mr. Evans points out, unless the tar produced in the low-temperature process commands a higher value on the thermal basis than high-temperature tar, the consumer of low-temperature fuel must be prepared to pay for the potential volatile therms in it at their true price before the process of low-temperature distillation can be expected to be as remunerative as that of high temperature. This proves the value of the therm interpretation in carbonization; and it

also demonstrates that the form in which the volatile therms are distributed—whether in gas, tar, or solid fuel—is a controllable factor, and may be altered or adjusted by the method of distillation adopted.

Under Section 1.

THE Director of Gas Administration keeps pegging away at the applications for Orders under section 1 of the Gas Regulation Act; and it is interesting to ascertain the progress that was made up to Dec. 31 of last year in the conversion of the industry from the volumetric basis of working to that of heat value. We have notified in the "JOURNAL" the week-by-week progress that has been made with this gigantic task since Mr. Honey commenced to tackle it; and now the National Gas Council have issued to the members a tabulated return showing the position of the Orders issued to the end of last year. Using that compilation for our computations, we can heartily congratulate the Director on the work accomplished. The statutory undertakings within his jurisdiction now number 797, of which 481 are companies, and 316 local authority concerns. Calculating from the National Gas Council records, we find that 507 Orders have been issued under section 1, and 56 amending Orders. The 507 Orders show there were at Dec. 31 still 290 undertakings to be dealt with; but this year will see a considerable reduction. A great majority of the balance are local authority ones; the incentives to come under the Act not having been considered so imperative in their case as in that of companies. In this attitude, we think the local authorities have made a mistake; but they are moving into line—slowly, but surely. It will be a good thing when the work is finally accomplished; but the Administrator, we take it, will not exercise his compulsory powers under the Act until the flow of applications and other work has sufficiently diminished to give him the time for dealing with a greater number. The 507 Orders under section 1 are composed of 488 issued in respect of England and Wales, 6 applying to Scotland, and 13 to Ireland. The Irish gas undertakings now come under the Government of the Irish Free State or that of Northern Ireland. These figures do not include the Special Orders issued under section 10, several of which have involved inquiries, and all of them judicial decisions.

It is of interest to analyze the declarations as to calorific value in respect of the Orders issued under section 1. They prove the wisdom of the Board of Fuel Research in having recommended Parliament, through the Board of Trade, to grant to the gas undertakings the power to declare the calorific value most appropriate to their individual conditions, and to charge for the gas on the common basis of the therm. We have learned more as to the economic effects of this freedom than was possible when Parliament, through mistaken obsession as to a uniform qualitative standard, tried to obtain this in totally dissimilar circumstances, and so did harm both to undertakings and to consumers. The most favoured zone for declarations is from 450 B.Th.U. to 500 B.Th.U. There have been 142 declarations of 450 B.Th.U., and 137 of 500 B.Th.U. Between those two figures, 34 undertakings declared 460 B.Th.U.; 1, 465 B.Th.U.; 26, 470 B.Th.U.; 46, 475 B.Th.U.; 39, 480 B.Th.U.; and 3, 490 B.Th.U. Below 450 B.Th.U., there have been 4 declarations at 440 B.Th.U.; 6, at 430 B.Th.U.; 31, at 425 B.Th.U.; 2, at 420 B.Th.U.; 2, at 410 B.Th.U.; 11, at 400 B.Th.U.; 1, at 360 B.Th.U.; and 1, at 320 B.Th.U. Above 500 B.Th.U., there have been 3 declarations at 510 B.Th.U.; 2, at 520 B.Th.U.; 1, at 525 B.Th.U.; 3, at 530 B.Th.U.; 2, at 540 B.Th.U.; 7, at 550 B.Th.U.; 1, at 560 B.Th.U.; and 1, at 600 B.Th.U. This 600 B.Th.U. declaration refers to Lampeter; and the 320 B.Th.U. one to Goring. These declarations total to 506; but there were four Orders under which declarations were still to be issued. These will make 510. The difference between this number and the 507 Orders granted is due to some concerns having two calorific values—one in respect of the inner district, and the other for outside areas.

The figures so far quoted all relate to the original Orders; but amending Orders have changed the first declarations in the case of 56 concerns. Experience and altered circumstances have enabled these revisions to be made with economic advantage—that is to say, working has proved the practicability of making the declared value approximate the actual value that is the most favourable to supply. This is seen by an examination of the changes effected. In one case, the alteration was from 400 to 425 B.Th.U.; in one, from 410 to 450 B.Th.U.; in four, from 425 to 450 B.Th.U.; in one, from 430 to 450 B.Th.U.; in one from 450 to 470 B.Th.U.; in one, from 460 to 470 B.Th.U.; in one, from 425 to 475 B.Th.U.; in seven, from 450 to 475 B.Th.U.; in one, from 460 to 475 B.Th.U.; in two, from 450 to 480 B.Th.U.; in two, from 460 to 480 B.Th.U.; in one, from 470 to 480 B.Th.U.; in seven, from 450 to 500 B.Th.U.; in one, from 460 to 500 B.Th.U.; in five, from 470 to 500 B.Th.U.; in five, from 475 to 500 B.Th.U.; in three, from 480 to 500 B.Th.U.; in one, from 450 to 510 B.Th.U.; in one, from 460 to 525 B.Th.U.; in one, from 500 to 525 B.Th.U.; in one, from 500 to 540 B.Th.U.; and in one, from 550 to 560 B.Th.U. It will be seen that some of the changes are small percentage ones; while others show considerable percentage rises. Among the undertakings which have made reductions are eight London and Suburban Companies. There have also been four reductions of the originally declared calorific values. Two undertakings have reduced from 450 to 425 B.Th.U.; one from 500 to 475 B.Th.U.; and one, from 550 to 450 B.Th.U. This all illustrates the value of the power of making changes in declaration to fit mutation in circumstances, or to derive benefit from the lessons of experience. We wonder whether all the declarations and changes have been made upon a study and ascertainment of the exact conditions which promote the maximum advantage in the circumstances of each undertaking. Perhaps a little doubt would be excusable.

Composition of Boards of Directors.

THIS is a subject upon which we have commented in times gone by, but more in respect of qualification than of age. In connection with it, we are struck by a remark made by Mr. W. G. Bradshaw at the meeting of the Commercial Gas Company. He was referring to the election of a new Director—the Hon. Kenneth Mackay, the son of Lord Inchcape. This is the remark: "He is, comparatively "speaking, a young man; but I am sure you will agree "that it is well for every company to have some younger "men about it, who will gradually acquire knowledge and "experience of its circumstances and needs, and will bring "to it the freshness and energy of youth." There is a great deal of wisdom in this; and there are boards of directors of which we have knowledge who would do well to accept the advice, and put it into practice. Effective direction of a special form of industry such as that of gas supply is something that cannot be undertaken in a day; and a mixture of younger men with those who have long held office provides an opportunity for the acquisition by them of knowledge essential to proper administration. They may almost be regarded as understudies to the older members. In some cases, there are Directors who have grown old during their service with companies, and yet whose extensive knowledge and experience it would be difficult to replace. But the time must come when their services will be no longer available. There are other directors who would be performing a graceful act by voluntarily retiring, to make room for younger men. The presence of the latter on a board is an assurance for the future. For administrations of gas undertakings as well as for officials, the cosy days when there was little competition have passed. Now competition is rife and pressing; obligations, interests, and responsibilities have expanded tremendously. There is good reason, therefore, when vacancies occur, to elect younger men to mix with the older; if vacancies are uncertain, and fairly young men are not already on the board, then perhaps there are members with an eye to the interests of the concern rather than to personal profit who would be prepared to retire so as to make way for the introduction of a younger element into the directorial composition.

Revision of Standard Prices.

BOTH Mr. Bradshaw at the Commercial Gas Company's meeting and Mr. Henry Woodall at that of the Tottenham Company referred to the beginning that has been made with the revision of standard prices under the Gas Regulation Act. They agreed that the standards fixed in 1921 are high now, though not in that year; and both showed that their Companies have not in respect of dividends taken any undue advantage of the power which the standards confer upon them. This fact, and the recognition of the

propriety of revision, have rather cut the ground from under the feet of those who are clamouring for revision, to which the Companies have no objection, provided revision is carried out justly. There seems to be a little weakness in the Gas Regulation Act in this connection. It limits the power of the Board of Trade (in a manner which may not have been designed in respect of revision) by the definite directions that have to be followed in increasing standard prices, and which directions, it appears to be accepted, must apply equally in making revisions of the standard prices. The Act notwithstanding, this is not fair, seeing that much work has been done in the industry since 1921 which has produced economies having advantages for the consumers, but which have nothing whatever to do with market costs of materials and labour, and rates and taxes, over which gas directors have no control. The standard price of the Commercial Company will soon be the subject of inquiry. Referring to this, Mr. Bradshaw says: "We "contend that whatever reduction is made, it should only "be in respect of those items of expenditure over which "the Company have no control; otherwise all incentive to "economy of working and good management would be "removed." We should like to see positive recognition of this; but does the Act permit of that recognition being made—though just?

Wanted, a More Attractive Gas-Fire.

OUR manufacturers of gas appliances will note this headline with interest. We are not making the request for something of more beautiful appearance in the way of a gas-fire. There is satisfaction on our part with what we see on the market, though we are hopeful it does not represent finality. Perhaps some day we shall get a little more sparkle into gas-fire radiants by incorporating in their composition a moderate amount of some rare earth. We do not, of course, want to use gas-fires as light-giving instruments; but certainly an investigation might be made to ascertain whether the uniformly heated surfaces of radiants could not in some manner be relieved by means suggested by the incandescent mantle. We rather think that long ago something was tried in this direction; but memory refuses to bring the results to mind. However, that by the way. It is the well-known authority on heating, Mr. A. H. Barker, who considers that the greatest service gas companies could render to the public at the present time would be to concentrate on the design of a gas-fire so as to endeavour to make it much more attractive than it is at present, and so render it comparable with the "beauty" of a coal fire. The "beauty" of a coal fire is limited to itself when incandescent, and by turning a blind eye upon the smoke, ashes, and dirt that are its inseparable accompaniments. If gas companies could produce a more pleasing fire, and at the same time reduce the price of gas (which they are doing as fast as possible), Mr. Barker believes the days of the coal fire would be numbered. This plea for a more attractive gas-fire is found in a lecture delivered at King's College early last month, and some of the features of which are given in another column.

Gas was referred to as the most practicable fuel with which to displace coal—in fact, Mr. Barker was able to catalogue quite a number of advantages in favour of gas-fires, and few disadvantages, which he himself showed were relatively unimportant when compared with the noxious and labour-creating effects of the coal fire. We recommend the views of this authority to consideration. There is, for example, the question of carbon monoxide in gas. In Mr. Barker's opinion, the only means of producing really cheap gas for fuel purposes in our homes is by increasing the amount of carbon monoxide. To some extent this view is subject to the definition of "cheap," because there are systems of producing gas in which the price per therm is getting very low, and in which the carbon monoxide content is not what we should call high. However, Mr. Barker asks the hygienic enthusiasts to bear this in mind: "There "is no doubt whatever that scores, and perhaps hundreds "of thousands, more deaths have been, and are being caused "every year by black smoke being poured into the air of "our cities than could ever be caused by gas poisoning, "even if gas consisted entirely of carbon monoxide." As to the cost of gas, Mr. Barker says that for heating it is three times as dear as coal; but he discounts this by stating that if, by the adoption of gas, it is possible to reduce the amount of work, so that it can be accomplished with one less maid-servant, the use of gas for this reason alone would be a great economy if it cost anything below £2 per week. There is the housewife, too. If her time has an actual value of 1s. per hour, it is more economical to use gas than coal, even though the cost of the fuel is three times as great. There is another point, that gas need only be used as and when required; whereas with coal there is probably more wasted when heat is not needed through having to "keep-in" the fire than is usefully consumed when heat is wanted. The more the question of the cost of gas in relation to coal is examined, the more the actual cost of the former dwindles in respect of service; while that of coal, with its expense-creating accompaniments, increases. However, it is a good thing to have the opinions of such an independent authority and critic as Mr. Barker.

Appliances Sold or on Hire.

Hearty congratulations to the Croydon Gas Company and their Distributing Engineer and Sales Manager, Mr. W. J. Sandeman. In making comparisons of results, we notice that during last year the increase in gas appliances supplied by way of sale or hire was no less than 10,992. This is a figure which is a record for the Company, and is therefore one of which to be proud. In the much larger Brentford Gas Company's area (the demand for gas in which is more than double that in the smaller Croydon district), the appliances sold and let on hire last year increased by 9970; and in the South Suburban Company's district by 4463, of which number 1766 were sold. Of course, districts vary one from another in their opportunities for doing business in new appliances; but the publication of such figures as these is calculated to stimulate responsible officials and sales staffs in their efforts to enlarge the number of consumption points.

Suburban Increases.

Some of the suburban gas companies are showing considerable increases in the sales of gas. Last year Tottenham scored 8·76 p.ct., Brentford 8·57 p.ct., and Croydon 8·14 p.ct. As percentages, these are remarkably close; in quantity, there would be large variation.

Coal Exports and Values.

The coal export trade of January fairly well maintained recent high levels. The total amount of coal of all sorts shipped was 5,440,637 tons; and this was valued at £6,678,877. The shipment in January, 1923, was 5,611,670 tons; but the value was lower—£6,295,820. In January, 1922, the exports only totalled to 4,020,935 tons, having a value of £4,783,539. There was a falling-off in the gas coal contribution last month—the quantity being 625,067 tons, compared with 704,360 tons in January, 1923. The respective total values were £755,467 and £783,996. The average value per ton last month was £1 4s. 2d.

Valuation of Gas Undertakings.

The County Council of Hertfordshire recently instructed a valuer to re-value the whole of the gas-works throughout the county; and it may be assumed that it was not for the purpose of reducing the assessments. A number of these undertakings instructed an expert, who advised some of them that they should not wait until the new valuations were made, but should appeal against the existing assessment. A case in point is Hemel Hempstead, in reference to which a paragraph appears in our news columns. The result is that, instead of an increased assessment, there is a very substantial reduction. In some other cases, where the companies did not act on the advice and object to the old assessment, the assessments have been doubled, trebled, and quadrupled. This only shows the necessity of gas undertakings giving a good deal more attention to the assessment question than they are doing.

Gas Coke Shipments.

The gas coke markets abroad last month showed good absorption. The quantity shipped was higher than in December—reaching no less than 144,402 tons, compared with 94,455 tons in January, 1923, and 67,709 tons in January, 1922. The total values were: January this year, £249,330; January, 1923, £131,237; and January, 1922, £103,778. The average value per ton last month was £1 14s. 6·3d.

Sulphate of Ammonia Exports.

The trade abroad in sulphate of ammonia continues to develop. Last month 36,289 tons were shipped; the value being £499,472. In January last year, 23,836 tons were exported; the value being £409,462. Japan was again a good purchaser; its requirements during the month being 16,131 tons. The Dutch East Indian market has also increased its custom. British makers, it is patent, are securing a good hold of markets overseas; and it is hoped to be able to maintain them to a large extent when outside competition again reaches full force.

The Mining "Crisis."

The giving of the three months' notice to terminate the national wages agreement in the mining industry has brought it to what the newspapers describe as a "crisis." This has not yet actually arrived; and it is hoped that investigation and a discussion of the results will avoid one. In a recent speech, Mr. Frank Varley, M.P., said: "We are within eight weeks of the most disastrous trouble in the coal-mining industry the country has ever known, and nothing has been done." The Mining Association has emphatically repudiated this assertion. Directly the notice was given to end the agreement, a Sub-Committee of the Association was appointed; and the matter has been under continuous and serious consideration ever since. The views of the District Mining Associations were also immediately taken. In conjunction with the Miners' Federation, a wages return is being prepared, to ascertain the rates of wages actually paid in each grade in every district, and the number of shifts worked. By arriving at preliminary agreement on all these points, it is considered that time will be saved in discussion. A further joint meeting has been fixed for March 6. Though these efforts are being made, no one can guarantee a successful issue. It will therefore be necessary for each gas undertaking to determine the best course to pursue, with the issue unknown. The only satisfaction in the position is that by April 17 (the day the notices expire), lighter and warmer weather will be here.

Coal Costs and Proceeds.

Particulars of the costs of production, proceeds, and profits of the coal mining industry in the quarter ended Sept. 30 last show, on a slightly higher output, rather less favourable financial results than those for the corresponding period of the previous year. Taking all districts together, the aggregate net surplus realized was £2,896,445, representing a profit of 1s. 0·22d. per ton sold. In the September quarter of 1922, the surplus was £2,907,681, or 1s. 1d. per ton. Nine areas, including the principal coalfields, earned profits ranging from a fraction of a penny to over 2s. per ton, and four returned deficits, of which the lowest was ¾d., and the highest over 2s. 2¾d. per ton. Of the total production of 61,999,982 tons, 56,863,078 were available for export and home consumption; and, on the basis of this last figure, the aggregate net costs work out at 18s. 10·09d. per ton, while sales at the pit-head realized 19s. 10·31d. The total number of workers employed was 1,108,259; and during the quarter 71,196,686 man-shifts were worked above and below ground. The average output and earnings per man-shift were respectively 17·42 cwt. and 10s. 7·2d. It is regrettable that as many as 6,402,572 man-shifts which could have been worked were lost.

The Dockers' Strike.

Last week, after a great deal of negotiation, long sittings, and much pressure from without and within, a settlement was reached between the parties concerned in the dockers' strike. The terms were an increase of 1s. a day at once; a further increase of 1s. the first week in June; an inquiry into decasualization and maintenance; and no victimization. But this did not end the strike. There was at first a disposition on the part of the men at important ports to repudiate the terms; their view being that nothing but the 2s. increase immediately applied should be accepted. The matter was therefore in the balance until the week-end, when mass meetings of the men were held. The leaders strongly urged acceptance, and reason prevailed. Work was resumed yesterday.

The next academic year of the University of Leeds, which begins in October, will see the completion of the fiftieth year from the opening of the Yorkshire College of Science, and also of the twenty-first year of the existence of the University. Celebrations will extend from Dec. 15 to Dec. 20.

PERSONAL.

Mr. R. Barker, Distribution Superintendent for the Doncaster Corporation Gas Department, has accepted a similar appointment with the Hastings and St. Leonard's Gas Company, and takes up his new duties in March. Mr. Barker, who went to Doncaster from Burnley in 1909, is very popular with his fellow gas officials.

The marriage was solemnized on the 12th inst., at Edgbaston Old Church, of Mr. C. Taylor and Miss Lillian A. S. Evans, only daughter of Mr. Edward E. Evans, of Ashfield Road, King's Heath, Birmingham. Mr. Evans has been connected with gas engineering for a great many years, and used to travel the whole of Great Britain.

Mr. William E. Settle has been elected by the Council a Fellow of the Institute of Inventors. Having been connected with his late father, Mr. Thomas Settle, in the major portion of his patents, and having worked with him through the experimental and other stages, it is to be hoped that Mr. William Settle will be enabled to a great extent to carry on the work of his father.

ELECTRICITY SUPPLY MEMORANDA.

We hear of successful competition with electricity for the renewal of street-lighting contracts. Among other places, it is said that Scarborough is going to show seaside resorts how lighting should be done economically and efficiently. The superheated cluster lamp, containing small-mantle units, has made a considerable difference to the competitive position of the gas industry in connection with street lighting. The lamps are economical in both gas and mantles; and the duty rendered is remarkably good in respect of consumption and the distribution of illumination. It is a case of the proper application of known principles. Such lamps are made in units which will suit practically any position. Then again, for shopping centres, South London is demonstrating, in an extraordinarily striking manner, the value of high-pressure lamps, of which there are (as Dr. Carpenter stated at the meeting of the South Metropolitan Gas Company) some thousands in use. Where electricity has least difficulty in getting-in for street lighting is where the electricity supply is run by the local authority, and not the gas supply. Hackney proposes to speculate enormously in this connection. The Works and Open Spaces and Electricity (Joint) Committee have put forward a scheme which will involve a total cost of £117,118 on mains and public lighting equipment. The borough has 3128 lamp-posts not yet fitted for electric lighting; and these, it is stated, are only shedding an illumination of not more than 50 c.p. To take over the whole of the public lighting, 108,400 yards of new distributing mains will be required. This will cost 26s. 9d. per yard, or £145,000 in all. It is clearly hoped these mains, in addition to public lighting, will pick-up business not at present available through the absence of cables. The cost of the lamp services will average £6 each, or a total of £18,768. The lamp-post equipments will be £4 5s. apiece, or in all £13,294; but a few non-standard ones will raise the total approximately to £13,500. The maintenance cost per lamp per annum is estimated at £3 6s. 6d.; and the loan charges will add 18s. 9d.—making £4 5s. 3d. per annum. The present charge per unit for public lighting is 1·55d.; but, in the new circumstances, 1d. per unit is proposed. The annual cost of the gas lighting is given as £11,874, and the electric lighting as £12,047, so that the change-over would result in an increased cost of £173. But it is expected that there will be savings on the scheme through assistance from the Unemployed Grants Committee. Even if assistance is given, someone has to pay. Moreover, estimates do not always work out so nicely and precisely as their authors would like them to do; and we have no doubt, if the Gas Company were given the opportunity to submit a fresh tender for the public lighting, they would suggest a scheme which, at to-day's prices, would give enhanced illumination at no greater annual outlay, and at a capital expenditure that would be small in comparison with that contemplated in favour of the municipal electricity undertaking. The figures from Hackney as to the costs of conversion are interesting and will be useful.

Public Lighting.

Perturbed.

A correspondent of the "Electrical Times," who signs himself "Observer," and is located in South Wales, is apparently perturbed at the advances that inverted gas-burners are making. He tells the readers of our contemporary that several gas concerns all over the country are busy pushing an "inverted intensified gas-fitting," with an unbreakable globe, which, they say, will give light for three hours at a cost of a penny. But he complains that these pushful concerns omit to state the candle power of the lamps. He rather thinks that the candle power soon falls off, and the globes get discoloured. So do the bulbs of electric lamps. There is an appreciable discoloration on the inside of electric-lamp bulbs, and likewise on the exterior. From the latter alone there may be as much as a 10 p.ct. depreciation of the light-giving power of the lamp, unless it is washed some

four or five times a year. The insides of electric bulbs cannot be cleansed; but gas globes can be taken off, and treated to a bath inside and outside. However, "Observer" says the gas companies may make temporary progress; but it is unkind of him to attempt to hurt the feelings of the men of the gas industry by adding that he does not think it will last. His letter, however, indicates that he is somewhat anxious. He would hear with interest what the experience of other electrical men has been with regard to competition from these particular fittings, and what steps are being taken to meet it. He would also like to have some actual figures and comparative costs. Why does not this inquisitive gentleman get the actual figures and comparative costs for himself? These can be very easily obtained.

Water-Heating Experts Differ.

Since Mr. C. G. Nobbs read his paper, before one of the Salesmen Conferences of the Electrical Development Association, on the subject of water-heating problems [*ante*, p. 365], a considerable amount of interest has been shown in the matter by our electrical friends; but even the experts cannot come to any definite agreement as to the best system of water heating for them to adopt with electricity as the agent. Mr. Nobbs, it will be remembered, favours the central storage system, with immersion heaters in the storage tank, and distributing pipes run to the various draw off points. Mr. Orme Bastian objects to the central storage system on account of the large heat losses which arise in the distributing pipes. In fact, during the discussion of Mr. Nobbs' paper, Mr. Bastian stated that with that system there was a 66 p.ct. loss of heat down the sink. He, therefore, prefers what is called the local storage plan, in which a container, complete with heater, is fixed adjacent to the fitting it is intended to serve. From this it will be seen that one expert favours a system which will be costly owing to the expensive nature of the heating agent, and which expensively purchased heat incurs a large amount of waste in the system. The other expert proposes a system which will reduce the heat losses; but the heating apparatus being localized at every point, would mean a considerable outlay in installation costs. "The Electrical Times," subsequent to the reading of the paper, drew attention to the differences in the views of these two experts, and both of them have made replies which are interesting at the present time when so much attention is being paid to the application of electricity to this particular purpose.

Mr. Bastian's Views.

The point that Mr. Bastian made as to 66 p.ct. of the heat being lost down the sink, has aroused considerable attention, because the heat waste naturally means that 66 p.ct. of the cost of the heat is also wasted. In his letter, Mr. Bastian says that he was thinking not only of pipe losses, but also of the important losses which result from such a common practice as washing-up under running water, and so forth. Then he gave his own experience. Formerly his scullery tap was about 50 ft. away from the hot water storage tank, and was connected by a pipe which would contain in itself a gallon of water. Of course hot water in a length of ¾-in. pipe such as he describes would not remain at a useful temperature for more than a few minutes; and this cold water had to be run off to the amount of a gallon before hot water could be drawn. Then when the tap was closed, the pipe was left hot, and full of hot water which had cost money to heat, and which in turn became cold, and had to be wasted before a further supply of hot water could be obtained. So the cycle of waste and useful effect and loss of heat and money proceeded. The same thing, of course, would occur in connection with any circulating system; but the difference is that in other systems the cost of the heat absorbed is not so great as in the case of electrical operation. The experience led Mr. Bastian to try the effect of installing local water-heaters, so as to eliminate the pipe losses as far as possible. But there are few people other than the wealthy and electrical engineers and contractors who would bear the expense of such an installation, in order to patronize electricity in preference to any other heating agent. However, since Mr. Bastian made the change to local water-heaters, he has found that the operating cost is only about one-third that which he previously experienced, reckoned at the same price per unit. He points out that one is apt to forget that the cold water, which first issues from the tap before hot water arrives, was itself hot water a short while before; and also the point is often overlooked that heat units are wasted in continually heating and cooling the pipe itself—bricks, plaster, and cement not really being very much good as heat insulators.

Then Those of Mr. Nobbs.

In his letter Mr. Nobbs criticizes Mr. Bastian's views. He accuses him of having adapted a principle from a single example, and a very bad example at that. He evidently regards it as an abnormal case, and quotes one in opposition which he describes as normal in everyday practice. Let us consider, he says, a residential flat or modern villa home. In such a case ½-in. galvanized pipe would be used for the sink service (½-in. nominal bore, ¾ in. external bore); and he assumes the distance from storage vessel to sink seldom exceeds 20 ft. However, to err on the right side, consider 25 ft. run of lagged pipe, 80 p.ct. efficiency. The contents of this piping is a third of a gallon and its heat emitting surface 5¼ sq.ft. The heat loss from the 25 ft. horizontal run (the worst condition) with water at 150° Fahr. in surrounding air of (room temperature) 65° may be determined by well-known formulæ: $W = Sk\,(t_1 - t_2)$, which for K = 1 6, and integrating the temperature drop, gives a total loss of under 120 B.Th.U. per hour. This corresponds to 40° drop in the first hour; so that if water was not drawn for an hour, the first one-third gallon would be drawn at 110° Fahr. and the irrecoverable wastage would be 33 watts. This he submits is not unreasonable and more nearly represents average practice than the experiment alluded to by Mr. Bastian. The electrical water-heating experts may go on arguing in this way; but as the solution of one difficulty only brings another in its train, things do not make much progress.

The Tag to the Scheme.

As we suspected, the "unique" electricity development scheme which the "Electrician" is promoting has not about it that true altruistic spirit which the first announcement would have justified readers in assuming was to be the case. Comment was made upon the scheme in the "Memoranda" last week. It will be remembered that it proposes that, at the expense of the proprietors of the "Electrician" (Messrs. Benn Bros., Ltd.), page advertisements shall be taken in twenty-six weekly newspapers in Great Britain—one each week for six months, and that these shall be divided up into spaces, and be offered to electrical firms free of cost to them. A second article has appeared on the subject in our contemporary, in which it is said that the main object aimed at is to develop in each area a greatly increased interest in electricity. But as we opined, this "National Campaign" has a second object. That it should have this, cannot of course be helped. The second object has naturally arisen through a basis of selection having to be found. Therefore, free newspaper space is being offered to advertisers in the "Electrician" in the proportion of one space in each of the twenty-six newspapers for each half-page advertisement arranged to appear in the "Electrician" weekly for the six months ending with the issue of Sept. 26. That is to say, each firm taking a half-page advertisement space at the ordinary rates for six months in our contemporary will be able to place an advertisement in the special all electrical page of twenty-six weekly newspapers distributed over the United Kingdom, "in areas ripe for electrical development," at the expense of the proprietors of the "Electrician." Full-page advertisements for the stipulated period will carry the right to two spaces, free of cost, for the twenty six areas; the spaces allotted to individual firms increasing in the ratio indicated. We thought, on reading the original announcement, there was a tag to the scheme which would somewhat detract from its money-sacrificing aspect. It will seem to some uncharitable people that the "main" idea is not to benefit the development of electricity supply.

PARIS VISIT OF THE INSTITUTION.

Preliminary Announcement.

As has already been intimated in the "JOURNAL," the annual general meeting of the Institution of Gas Engineers will be held in London on June 24, 25, and 26—at the Institution of Electrical Engineers, Victoria Embankment, under the Presidency of Mr. Samuel Tagg, of Preston. On the evening of Tuesday, June 24, a reception and dance will be given by the President and Mrs. Tagg, at the Connaught Rooms, Great Queen Street. In view of the large number of visitors who will be attracted to London by the British Empire Exhibition, members are strongly advised to make early reservations for hotels.

An invitation to the Institution to assist in the celebrations of the centenary of the gas industry in France, and the jubilee of the Société Technique de l'Industrie du Gaz en France, under the Presidency of M. F. Rouland, has been cordially accepted, and an excellent programme has provisionally been mapped out. The arrangements for travelling and hotel accommodation have been placed in the hands of Messrs. Thomas Cook and Son, and a private party will leave Victoria on Thursday afternoon, June 26, at 4.30. On Friday a wreath will be placed on the grave of the Unknown Warrior at the Arc de Triomphe, and the principal places of interest in Paris will be visited.

On the Friday evening the jubilee banquet of the Société Technique will take place. Ladies, it may be remarked, are included in all the invitations, except the banquet, on which occasion another entertainment will be provided for them. An international exhibition of gas apparatus and appliances* is to form an important feature of the centenary programme; and on the Saturday there will be a visit to this, and in the afternoon a reception at the Hotel de Ville. Sunday will be devoted to an excursion from Paris to Saint Quentin, and at 10 a.m. on Monday, June 30, members will leave Paris on their return to London.

Mr. Walter T. Dunn forwards a copy of Messrs. Cook and Son's circular, giving details of the cost of journey, hotels, &c., with a reply form to be sent to the firm direct.

As an alternative to the visit to Paris, members of the Institution and their friends may desire to visit the British Empire Exhibition, and arrangements will be made for luncheon there on Friday, June 27.

* Reference to the projected exhibition of gas appliances was made in Vol. CLXIV. of the "JOURNAL," p. 376.

THE HEATING OF HOUSES.*

A Scientist's Views on the Value of Gas for Heating.

An important lecture on "The Heating of Houses" was delivered at King's College, London, on Jan. 6, by Mr. A. H. Barker, B.A., B.Sc., Wh. Sc., an authority on the subject of heating.

After ruling out electricity as being too expensive for heating—to quote his own words, "it is too expensive for anyone who is not a millionaire"—he states that gas is the practicable fuel, with the fewest disadvantages, for general domestic purposes, for the principal reasons that: (1) It is carried without any labour to the place where it is burnt. (2) There are no ashes to clear away. (3) No smoke or dirt is produced. (4) The rate of heat production can be regulated instantaneously by the mere turning of a tap. (5) It is instantly available at any hour of the day or night. The main disadvantages—the first of which is a serious drawback—are: (1) That it is poisonous until it is completely burnt. (2) That the heat cannot be derived from gas without giving products of combustion. These, however, though undesirable in many ways, are not poisonous unless the gas is incompletely burnt. (3) That it is three times as dear as coal.

With such a large collection of advantages and so few disadvantages, it is astonishing that more progress has not been made in entirely displacing solid by gaseous fuel in the matter of heating domestic interiors.

The two principal reasons which have militated against the entire displacement of solid fuel by gas are, first, the undeniably charming and comforting appearance of a fire produced by solid fuel thrown haphazard on to a burning heap, and, secondly, the relatively high price of gas. Also, perhaps, the failure of gas engineers, up to the present, to produce a gas-fire which is not relatively ugly and unsympathetic, compared with the intrinsic beauty of a coal fire. Till these disadvantages are overcome, by the cheapening of gas and by the production of a more beautiful furnace in which to burn it, the progress of the gas-fire will be limited.

Here it may not be out of place to utter a word of warning to those enthusiasts who are bent on crippling the gas companies by advocating legislative restrictions as to the composition of the gas—prohibiting the supply of gas with more than a certain percentage of carbon monoxide. So far as it is possible to see, the only hope of producing really cheap gas for burning in our houses is by increasing the amount of carbon monoxide and by withdrawing all unnecessary restrictions on the gas companies as to the composition of the gas supply, but insisting only on value for money. That this will make the use of gas more dangerous cannot, of course, be denied; but it is the only hope of producing really cheap gas. Hygienic enthusiasts should bear this in mind. There is no doubt whatever that scores, and perhaps hundreds of thousands, more deaths have been, and are being, caused every year by black smoke being poured into the air of our cities than could ever be caused by gas poisoning, even if gas consisted entirely of carbon monoxide. It is really a choice of evils, of which we should prove the less; and the less in this connection is certainly the poisonous composition of the gas. It is nothing like so great an evil as the vile and filthy condition of our atmosphere. If all the coal fires in London had been replaced by gas-fires, there would be no black fog in London to-day.

In my view, the greatest service that gas companies could render to the public at the present time would be to concentrate on the design of a gas-fire, and endeavour to make it much more attractive than it is at present in appearance, in order to make it comparable with the beauty of a coal fire. If they can do this, and at the same time reduce the price of gas, I have not the least doubt that the days of the coal fire will be numbered, as its numerous disadvantages would put it out of court, however attractive it may be. We simply cannot afford to have God's sweet air poisoned by the use of smoky coal.

In discussing the cost of gas, there is one more point which must be remembered. It is that if, by the adoption of gas in a house instead of solid fuel, it is possible to reduce the amount of work so that it can be accomplished with one less maidservant, the use of gas for this reason alone would be a great economy, if it cost anything below £2 per week. Indeed, I have proved conclusively by measurement that if the time of the housewife has an actual value of 1s. per hour, it is much more economical to use gas than coal, even though the cost of fuel is three times as great. The value of the time saved by the use of gas is more than the additional cost of the fuel.

* The full text of this lecture is published in the current issue of "Domestic Engineering."

Wills.—Prof. Frank Clowes, D.Sc., many years chemical adviser to the London County Council, and expert adviser in gas to the Corporation of London, who died on Dec. 18, aged 75, left £22,234, with net personalty £21,987. Mr. John Glasbrook, for many years Chairman of the Swansea Gas Light Company, who died on Dec. 31, left estate of the net value (so far as could be ascertained at the time the will was proved) of £931,076. Until recently his firm owned the largest collieries in the Swansea district. Mr. Archibald P. Main, of Messrs. R. & A. Main, Ltd., who died at the age of 66, left £14,956, with net personalty £12,884.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

Visit to Dumbarton.

Over eighty members of the Western District of the Association visited the new gas-works at Dumbarton last Saturday, and were received there by Provost Garrick and Mr. James Bell (Engineer and Manager). Provost Garrick having welcomed the Juniors to Dumbarton, the company were formed into small groups and shown over the works.

The new gas-works of the Dumbarton Town Council have been completed, and, though the formal opening will not take place until October, the town is being supplied from the new plant. The site has an area of 10 acres, which will permit of the future extension of the works. The retort-house is of the Glover-West design, and contains four settings of four retorts each. The retorts are of elliptical section and 21 ft. long. The elliptical shape gives greater rigidity and more resistance to distortion, and presents a maximum heating surface. Each unit of four retorts is heated by a separate producer, and can be independently operated. The intensity of heating can be varied as required, from top to bottom of the retorts, by dampers at each floor level, thus enabling the plant to deal efficiently with different qualities of coal. The installation has a capacity of 750,000 c.ft. per 24 hours. The house is carried on a reinforced concrete raft, supported on 94 piles (made of reinforced concrete), 14 in. square section and 55 ft. long. The producers are of the step-grate type. No clinkering is required, it being only necessary to remove ashes at convenient intervals.

Coal wagons are hauled from the neighbouring railway by a 40 H.P. petrol locomotive to a 10-ton receiving hopper over the breakers, where they are up-ended by two hydraulic tippers. From the breaker pit the coal is taken by a gravity bucket conveyor to the overhead steel storage bunkers, which hold a 48-hours' supply. From the overhead bunkers the coal drops through controlled valves into the retort hoppers. Coal not required in the overhead bunkers falls down a shoot into the coal store, which has a capacity of 700 tons. The coke chambers below the retorts empty into side-tipping wagons, running on rails to a lift, which raises the wagons to a height of 40 ft. to the coke-hopper level. The wagons leave the retort-house by a gantry leading to the screening plant and storage hoppers.

Much of the other plant at the new works was formerly in use at the old ones. The condensers, for instance, were erected at the old works in 1912, and are in excellent condition, as are the exhausters, which can claim a similar length of service. The exhausters being in duplicate, their removal was simplified. The Livesey washer and purifiers are new. The purifiers were made originally to the order of the British Admiralty for an air station, but were never erected. There are four boxes, 30 ft. by 25 ft. by 5 ft. deep. The new gasholder is a three-lift spiral-guided one, with a capacity of 750,000 c.ft., or about three-and-a-half times the capacity of the old holders. The above-ground steel tank is 107 ft. in diameter and 32 ft. 6 in. deep, and rests on a reinforced concrete foundation. The tank is provided round its circumference with 20 vertical lattice-steel piers.

A range of offices, workshops, and stores forms a frontage to the works. All mainlaying, pipe connections, and minor work was carried out by the gas-works staff.

After the inspection, the company were conveyed to the Town Hall, where the Gas Committee entertained them, under the Chairmanship of Provost Garrick.

The CHAIRMAN expressed the pleasure the Gas Committee had in being present that day, and thanked the Scottish Juniors for honouring them by selecting their works as worthy of a visit. They were proud of them, and particularly so in that they were designed and laid out by their own Engineer (Mr. Bell), who was the first Vice-President and second President of the Western District of the Scottish Junior Gas Association.

Bailie WARD, in proposing the toast of the Association, also paid a tribute to Mr. Bell, and heartily commended the work and objects of the Association.

The PRESIDENT (Mr. A. Walker) replied, and assured the members of the Dumbarton Corporation that the Juniors had spent a really profitable afternoon. In their visits they had inspected old works, and works reconstructed, and that day they had had the privilege of seeing an entirely new works on a new site. They would take away with them impressions of how a new works should be constructed; and, as Provost Garrick has said, they of Dumbarton were proud of their works. He was sure the Scottish Juniors would agree that Dumbarton had something to be proud of. He thanked them for the privilege of visiting the works, for their kind hospitality, and Provost Garrick for his presence that afternoon. He also thanked Mr. Bell and his assistants for the very courteous manner in which they had explained the many details at the works.

Mr. JOHN W. M'LUSKY (Glasgow) expressed his pleasure in being present, and saying a good word about Dumbarton and their Engineer. He congratulated the Provost very heartily indeed on the new works, and submitted the toast of Provost Garrick and the Dumbarton Gas Committee.

The PROVOST, replying, said that after adverse criticism for some years, it was gratifying indeed to be present that day. It was a great pleasure to him to know that the Scottish Junior Association had found the works of interest.

A STUDY OF THE DESTRUCTIVE DISTILLATION OF COAL.

By E. V. EVANS, O.B.E., F.I.C., Chief Chemist and Products Manager of the South Metropolitan Gas Company.

[The First of a Series of Three Cantor Lectures delivered at the Royal Society of Arts. Monday, Feb. 25.]

It is with considerable temerity that the author addresses you on the subject of the destructive distillation of coal, and his ability to do so may be open to just criticism in view of the fact that his first-hand experience in these matters is confined to the carbonization of coal in horizontal retorts, and does not comprise the working of verticals and the manufacture of water gas. It is proposed, however, to deal mainly with the principles underlying the process of carbonization; and it is believed that these do not vary so fundamentally in the different systems that these lectures will fail to render some service to the gas and allied industries.

In the Cantor Lectures of 1919 Prof. Bone dealt in a comprehensive way with the general question of coal conservation; and the author desires, in perhaps a less direct manner, to make a further contribution to this subject, but from the viewpoint of a chemist in the gas industry. It is proposed in these lectures to consider the destructive distillation of coal as a true chemical process, the raw material entering being therms, while the process itself consists in the distribution of the original thermal energy of the coal into more useful and more economic forms.

THE CONVERSION OF THERMAL ENERGY.

The introduction of the therm system met with a cold reception at the hands both of the public and of the gas industry; but this has to-day given place to a quiet acknowledgment of its value, It is not the consumer alone who benefits by the therm system. but in the industry itself the new interpretation of results is leading to increased efficiency. At first we almost resented the computation of working results on a basis of therms per ton of coal carbonized rather than c.ft. of gas of standard calorific value, feeling that there was essentially no difference in the two methods of stating results. Fundamentally, there is no difference; yet it is probable that the adoption of this system is likely to constitute a very great step in the appreciation of the coal conservation problem. Though there is no intrinsic difference, the gas manufacturer to-day sees more clearly that the ship, barge, or wagon bringing coal to his works is delivering a load of therms, a certain proportion of which may be distilled off by heat, and that it is his duty to distribute these therms so carefully into gas, tar, and coke, or coke, tar, and gas, as the case may be, that the process may be carried out with the maximum conservation of therms.

The author's experience in the working-up of chemical bye-products has brought him into the closest working relationship with the chemical industry; and he has observed that the chemical manufacturer approaches his task with a materially different outlook from that of the manufacturer of gas, who, in the past, has not universally realized that he is operating what is essentially a chemical process. In the chemical industry few large-scale reactions are carried out with a 100 p.ct. yield of product, but a fierce struggle exists among chemical manufacturers to attain the highest possible yield, as their power to compete in the open market is largely determined by the efficiency of the process adopted. The amount of aniline made from unit weight of benzole, of beta-naphthol from naphthalene, of anthraquinone from anthracene, is measured and controlled with the greatest diligence. The chemical industry can flourish only if these principles of conservation (*i.e.*, maximum yield of products) and complete utilization of bye-products are studied and developed day by day. The gas engineer to-day realizes that his task differs only from that of the chemical manufacturer by the fact that he deals in therms and that his efficiency to compete depends upon his ability to market solid, liquid, and gaseous therms in the most economical way. Each new development in our knowledge of the constitution of coal or its behaviour under heat—whether it be made at the University of Leeds, or at the Imperial College of Science, or under the Fuel Research Board, or in the gas industry itself—brings the process of coal distillation nearer to a true chemical process.

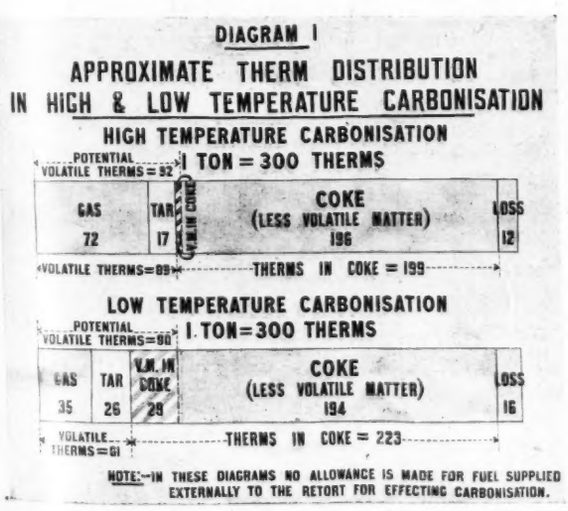


DIAGRAM I
APPROXIMATE THERM DISTRIBUTION
IN HIGH & LOW TEMPERATURE CARBONISATION
HIGH TEMPERATURE CARBONISATION
POTENTIAL VOLATILE THERMS = 92
1 TON = 300 THERMS
GAS 72
TAR 17
V.M. IN COKE
COKE (LESS VOLATILE MATTER) 196
LOSS 12
VOLATILE THERMS = 89
THERMS IN COKE = 199
LOW TEMPERATURE CARBONISATION
POTENTIAL VOLATILE THERMS = 90
1 TON = 300 THERMS
GAS 35
TAR 26
V.M. IN COKE 29
COKE (LESS VOLATILE MATTER) 194
LOSS 16
VOLATILE THERMS = 61
THERMS IN COKE = 223
NOTE:—IN THESE DIAGRAMS NO ALLOWANCE IS MADE FOR FUEL SUPPLIED EXTERNALLY TO THE RETORT FOR EFFECTING CARBONISATION.

Fig. 1.

"BYE-PRODUCTS"—NOT "RESIDUALS."

Our major duty in the gas industry is obviously to manufacture gas; but this responsibility should not cause us to overlook the fact that it is always possible to distribute the therms of the original coal into gas, tar, and coke in a variety of ways. The method of distribution is determined by the nature of the process we adopt and the conditions of operation. During these lectures it is proposed to analyze these principles of carbonization. For the moment, you will agree that in the interests of our main product—coal gas—we are bound to devote the utmost attention (as does the chemical industry) to all subsidiary products. When it is generally realized that these subsidiary products are sources of potential therms, they will be placed in a position only just second to that of gas, and the word "residual" will, it is to be hoped, entirely disappear from our industrial vocabulary and be replaced by "bye-product."

In pursuing this interpretation of the carbonization process as one in which the original thermal energy of the coal is distributed into more useful and economic forms, it is interesting to study the distribution effected by high and low temperature carbonization. Fig. 1 represents the general distribution of therms which results when coal is heated by these two processes, the coal being assumed to contain 300 therms per ton.

LOW AND HIGH TEMPERATURE CARBONIZATION.

In the case of high-temperature distillation (without the admission of steam) 1 ton of coal containing 300 therms will yield about 72 therms of gas of 560 B.Th.U. per c.ft., and some 17 therms of tar, leaving coke containing about 199 therms. The process loss will be of the order of about 12 therms. It will be observed that the loss in the case of low-temperature carbonization is of the order of 16 therms, as compared with 12 therms in high-temperature carbonization. The loss of therms from the original coal substance is due in both cases to the fact that the heat required for distillation is not taken wholly through the walls of the retort, but is partly supplied from the coal substance itself undergoing carbonization. The greater part of the heat thus supplied is made available during the early stages of the carbonization process. It is therefore not surprising to find that the loss experienced during the low-temperature process, when exothermic reactions predominate, is greater than in complete carbonization, because the heat liberated during the exothermic period has disappeared as sensible heat, while in complete carbonization the effect of this disappearance is partly neutralized by the conversion of sensible heat into potential heat at the higher temperatures. On the other hand, the low-temperature carbonization of 1 ton of coal containing originally 300 therms yields some 35 therms of gas of 1090 B.Th.U. per c.ft. (3200 c.ft.), together with 26 therms as low-temperature tar, and 223 therms of coke itself containing 9·3 p.ct. of volatile matter. Determinations made upon low-temperature fuel containing about 10 p.ct. volatile matter have shown that the 9·3 p.ct. of volatile matter remaining in the coke would represent about 29 therms of the potential volatile matter of the original coal. Now if this potential volatile matter be added to the amount actually obtained, there is practically no difference in the yield of so-called volatile therms and coke therms in the two methods of carbonization. Such slight difference as does exist is to the advantage of high-temperature carbonization, but this may be fortuitous. There is, of course, a difference in favour of low-temperature carbonization represented by the slightly lower fuel consumption required for the process of distillation; but the bye-products, gas and tar, and even the solid fuel itself, must not be utilized for this purpose. The therm in its cheapest form should be employed, as is the case with coal-gas manufacture.

From these results, which have been obtained from the same sample of coal, it would appear that the low-temperature process is not superior from the point of view of efficiency of distribution. It simply results in a different distribution of the thermal energy of the original coal—it is the high-temperature process arrested. This is a most important observation in view of the fact that the pure chemist is naturally inclined to believe that high-temperature carbonization, with its known drastic decomposition of the coal substance, is a wasteful process, and that the low-temperature treatment is more conducive to the conservation of the energy of the coal substance. It is known that drastic decomposition can and does take place; and this subject will be dealt with later. But, provided the high-temperature process is conducted so as to obtain yields similar to those indicated in the diagram, there would appear to be no ground for supposing the low-temperature process

to be definitely superior from the point of view of conservation of energy.

Now the 29 therms of potential volatile matter retained in the low-temperature coke are subsequently burned in the household fire as a low calorific value gas. There are no complex hydrocarbons to be distilled away or partially burned with the production of soot or smoky flames, as is the case with ordinary household coal. The material is, in fact, a coal-gas coke mixture. There is no wonder, therefore, that it produces agreeable results; but the question is—can the consumer of this fuel afford to pay for the potential coal gas left in it? The economics of the problem of low-temperature carbonization are probably larger than the technical difficulties. Coal is conveyed to, and lifted into, the retort, is raised to a temperature of some 600° C., 61 therms of volatile matter are distilled away, and the material is subsequently cooled and discharged. Now if this process had been carried out at a higher temperature, and for a slightly longer period, but without any appreciable increase in labour costs, the volatile matter would have been converted to gaseous therms and sold at the ruling price of gas per therm. There is not likely to be an appreciable difference between the value of the therm in high and low temperature gas; and unless the tar produced in this process commands a higher value on the thermal basis than high-temperature tar, it would appear that the consumer of low-temperature fuel must be prepared to pay for practically the whole of the potential volatile therms at their true gas price before the process of low-temperature distillation can be expected to be as remunerative as that of high-temperature.

This somewhat lengthy analysis of the low-temperature process has been introduced partly for the purpose of demonstrating the fact that the destructive distillation process should be viewed as a means of distributing the energy of the original coal into therms of different value, partly with the object of proving the value of the therm interpretation in carbonization and finally to prepare the way for demonstrating that the form in which the volatile therms are distributed—whether in gas, tar, or in solid fuel—is controllable and may be altered or adjusted by the method of distillation adopted.

Loss of Gaseous Therms.

The question of the prevention of gaseous therm wastage will now be dealt with. The secret of preventing wastage of gaseous therms and of conserving the energy of the original coal lies in the possession of a suitable design of retort-bench fittings and accessory plant, and in their maintenance in the highest possible state of efficiency and repair. This cannot be over-emphasized, for in the gas industry there are many investigators striving to devise processes which shall represent a distinct advance in the destructive distillation of coal, whereas I believe that what can be done in this respect in the laboratory is infinitesimal compared with the wastage that may occur by an inadequate reproduction of working conditions on the large scale.

Design of Retort Settings.

In the design of retort settings the engineer and chemist agree that the following requirements are essential:

(1) That the distribution of heat throughout the length of each retort should be fairly uniform.
(2) That the heat should decrease sharply at the ends of the retort.
(3) That the rate of transmission of heat through the wall of the retort should be practically the same in the case of all retorts in one setting.
(4) That the retort should contain such a size of charge that complete carbonization is possible, and whatever mass of charge is decided upon, it is naturally of great consequence that it should lie evenly throughout the retort. This latter factor is, of course, dependent upon well-designed and well-operated charging machinery.

This list of requirements could, as you know, be materially expanded. A technical chemist accustomed to making chemical and physical determinations in the retort-house possesses concrete ideas of the fundamental requirements to be observed in the design and working of furnaces and retort settings, and is appreciative of their influence upon the final carbonizing results. He is thus able to indicate sources of loss, and the conditions which produce unsatisfactory process yields; but his ability to design or re-design large-scale retort settings and plant, in order to attain the required end, is limited. As far as the author's experience goes, the desired adjustments are better left in the hands of the technical chemist and the observant gas engineer, the latter, by a process of trial and error in the design of retort settings, having become master of the subject.

The question of the effect upon thermal yield and the constitution of the gas of maintaining in a state of good repair the retort and the fittings external to it is one to which considerable attention has been given by the author. Comparative carbonizing trials have been carried through in sound and leaky retorts; and the effect of different types of leaks upon the volume, calorific value, and composition of the gas produced has been examined. These trials have been conducted in an experimental plant capable of carbonizing 3 tons of coal per day. A typical Durham gas coal has been used throughout, and the conditions maintained have been such as would reproduce results normally obtained by carbonizing 10-cwt. charges in 20-ft. retorts for a period of 10 hours, with a combustion-chamber temperature of 1320° C. The vacuum maintained during the period of carbonization was 3-tenths water pressure, obtained by the maintenance in the hydraulic main of 13 tenths vacuum, and 1-in. liquor seal.

It will first be necessary to examine some typical carbonizing results obtained under these conditions in tight retorts; and fig. 2 shows an average result obtained under the stated conditions. The gaseous thermal yield is of the order of 73·5 therms per ton, the total volume of 566 B.Th U gas produced being 13,000 c.ft. The first curve shows the volume of gas produced hourly, and the second curve the gradual decrease in the calorific value of the gas during the period of carbonization. One is at once impressed by the small amount of useful work effected in the last few hours when the rate of heat transmission through the walls of the retorts has been considerably reduced; and an examination of the analysis diagram, which indicates according to the known method of presentation the hourly changes in the constitution of the gas, confirms this impression.

The Thermal Model.

The author has found that a convenient method of examining the amount of useful work effected during each hour of the carbonizing period is to produce a thermal model. This is constructed by combining the hourly volume curve and calorific value curve of fig. 2. In fig. 3 it will be seen that the length A of the thermal model represents the time of carbonization in hours, while the height B of the model represents the volume of gas produced, and the breadth C of the model the calorific value. The value of this means of representation is, first, that the mass of the model itself is proportional to the thermal yield of gas from the coal, and, secondly, that a section taken at any one period shows in its

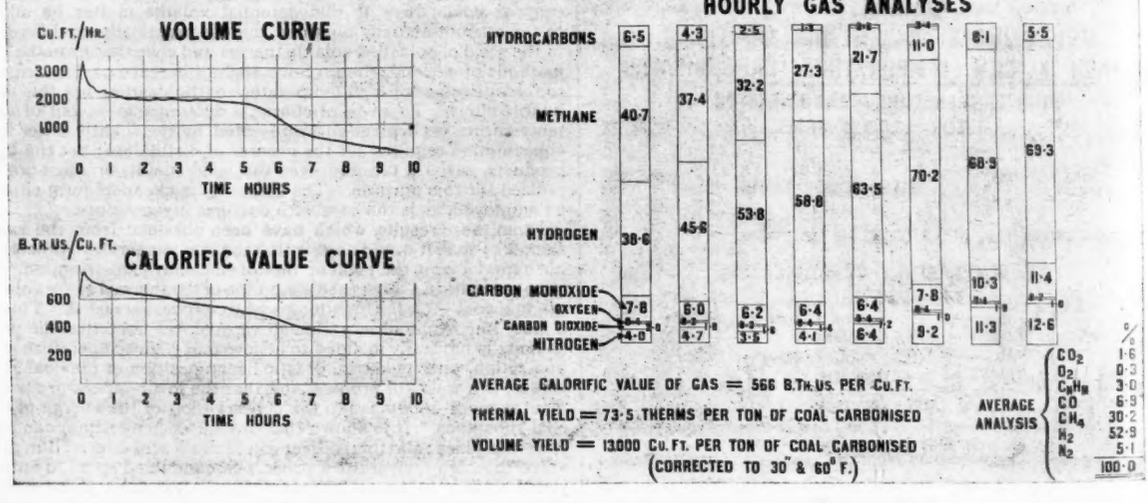


Fig. 2.

area the amount of work being done at that instant. Fig. 4 shows sections of the model taken from the middle 10-minute period of the first and last hours of the carbonizing period and the immense difference that exists in the amount of useful work done will be noted.

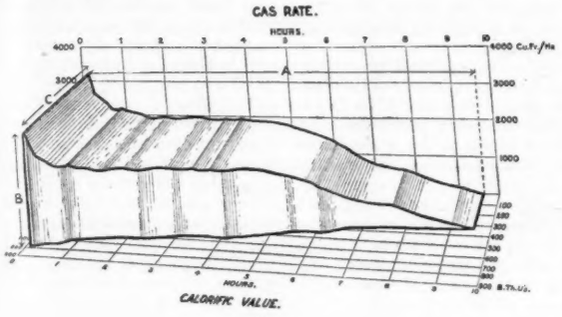


Fig. 3.

The thermal model shown in fig. 3 is constructed from a series of carbonizing trials on an experimental plant; but the results are comparable with what may be obtained in average practice. As indicated before, one of the outstanding observations to be made is the large volume of gas of very high calorific value evolved in the first ten minutes after closing the door of the retort. In this period 5·04 p.ct. of the total gaseous therms are produced; and, knowing that the constituents of such a gas are likely to be unstable and quite unsuitable to withstand contact with the heated sides of the retorts, it was decided to attempt to apply a much higher vacuum during this early stage of the carbonizing period, for the purpose of preventing decomposition. Carbonizing trials were carried through in which there was an initial vacuum of 20-tenths, which was reduced 3-tenths every 10 minutes, until the normal vacuum of 3-tenths was attained. There was thus a gradually decreasing high vacuum during the first hour of carbonization, while the normal vacuum was maintained throughout the remaining carbonizing period. These conditions have proved successful in materially reducing the calorific value and extending the volume of gas made during the early stages of carbonization (fig. 5). The black curve represents the control experiment carried out under normal conditions, in which case the average calorific value of the gas was 563 B.Th.U., and the thermal yield 73'5 per ton of coal. A comparison of the resulting thermal model with that obtained under standard conditions also emphasizes the effect upon the calorific value and volume of the gas produced of maintaining a high vacuum at the commencement of carbonization (fig. 6). In the carbonization trial under these special conditions, the average calorific value of the gas was 542 B.Th.U.; but it is disappointing to observe that no apparent advantage in the gaseous thermal yield was realized. It would appear from this, and a number of similar experiments, that little advantage is likely to materialize from adopting a procedure of this nature, provided the retort is tight and in good condition. Had there existed a hole or cracks in the retort, this method of working would be expected to prevent losses from the retort when the rate of evolution of gas is at its highest. This procedure is, however, only of academic interest, for it is not generally possible in gas-works practice to produce a high pull only in those retorts which have been newly charged.

SECTIONS SHOWING THERMAL YIELD DURING MIDDLE 10 MINUTES OF FIRST AND LAST HOUR OF CARBONIZING PERIOD.

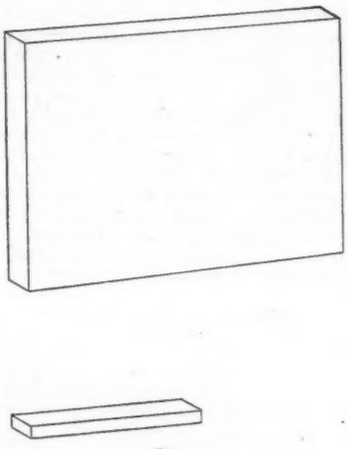


Fig. 4.

— VOLUME & CALORIFIC VALUE CURVES —
SHOWING EFFECT OF
— MAINTAINING HIGH VACUUM DURING FIRST HOUR OF CARBONISATION —
— CONTROL IN FULL LINE —

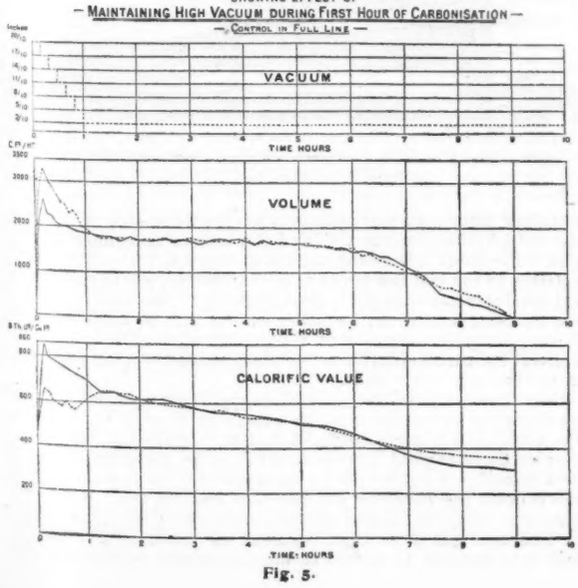


Fig. 5.

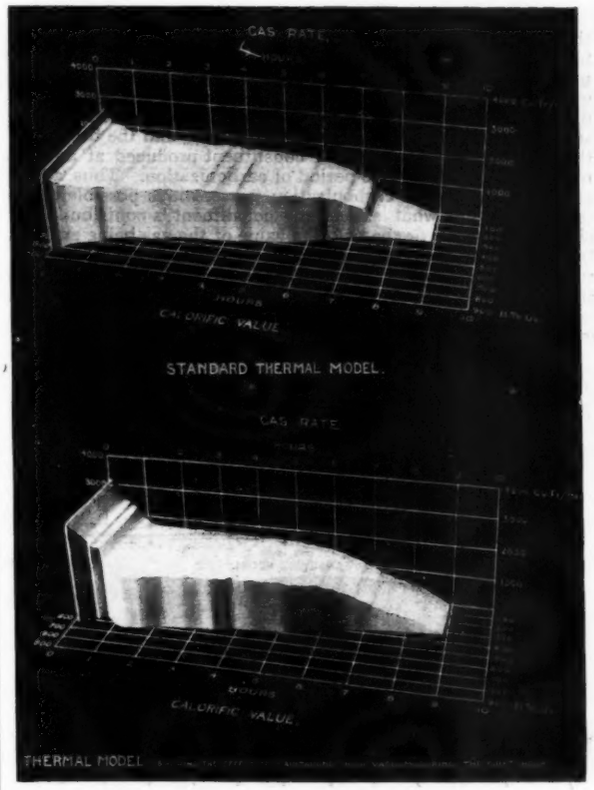


Fig. 6.

The thermal models constitute an excellent device for detecting any slight differences in the carbonizing process, or for determining the effect of any adjustments of the conditions of working. The model shown in fig. 7 furnishes an example of the sensitivity of these models. It demonstrates results obtained from normal carbonizing procedure. For obtaining a high thermal yield it has been found necessary to reduce the vacuum in the hydraulic main of any one section to level gauge when some of the retort doors of that section are open for charging or discharging. As hourly charging is adopted, it is thus the practice to reduce to level gauge for 10 minutes during each hour. An examination of the thermal model will show that at these periods there is a definite indent in the volume curve, and that immediately following this, when the vacuum is re-established, there is a corresponding peak in the calorific-value curve. It is evident, therefore, that gas has been throttled-up during this period of level gauge Generally speaking, this method of procedure does not materially affect the thermal yield of gas, provided the retorts are tight. It will be demonstrated later how disastrous is this practice in the case of an unsound retort.

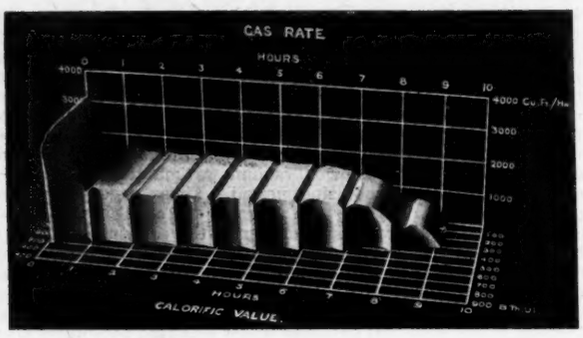


Fig. 7.

THE ANALYSIS MODEL.

In order to show clearly the composition and thermal value of the gases obtained by carbonization under normal conditions, it is possible to construct from the analysis curve an analysis model. The lower portion of fig. 8 shows the structure of such a model, which is composed of various sections representing the different constituents of the gas; the height of each section representing the calorific value of the constituent, and the breadth of the section the volume of that constituent produced at any one moment during the whole period of carbonization. Thus, at any given time during the carbonization process it is possible to observe exactly to what extent any constituent is contributing to either the volume or the calorific value of the gas being evolved, by reference to the section of the model representing that constituent. It is evident that, by looking down on the model in plan, a simple reproduction of the stratified analysis curve will be seen, and the analysis model is produced by making the height of each constituent proportional to its calorific value.

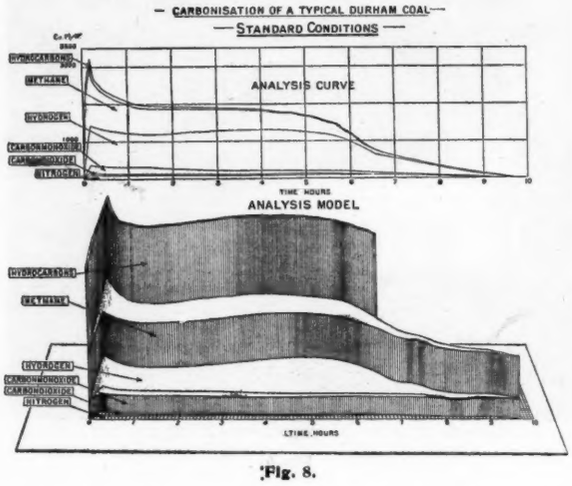


Fig. 8.

From this analysis curve it will be seen that the production of inert constituents is fairly constant up to the seventh hour; carbon monoxide is evolved fairly evenly until the eighth hour, when it tapers off; while hydrogen gradually increases during the carbonizing period until a maximum is attained in the region of the fourth hour. Methane production is at its height during the first ten minutes, and tapers off sharply until at the end of the second hour a fairly constant quantity is being produced. The unsaturated hydrocarbons, important though they are as regards their contribution to calorific value, are quite small in volume, and tail off at the sixth hour. Whereas the analysis curve shows the hourly production of each constituent of the gas, the analysis model demonstrates the contribution of each constituent to the total thermal yield and also to the effective work at any one moment during the whole carbonizing period. It thus shows in a convincing manner the true value of each constituent. In the case of the inert constituents nitrogen, carbon dioxide, and oxygen, it is obvious that as these possess no calorific value they will be represented without height in the model, and it will be seen that they are shown simply possessing area at the foot of the model. The most outstanding feature of this model is the layer representing the unsaturated hydrocarbons which disappear at the end of the sixth hour. This layer has considerable height owing to the high calorific value of the unsaturated compounds, but is practically a knife edge owing to their small volume.

EFFECT OF HOLE IN RETORT.

Reverting now to the soundness of the retort and its effect upon the nature of the gas made and the yield of gaseous therms, fig. 9 represents the results obtained from working under

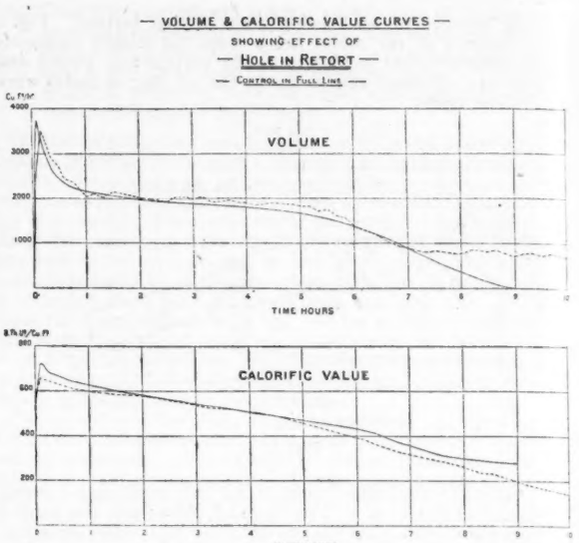


Fig. 9.

standard conditions—*i.e.*, with a continuous pull of 3-tenths—but with a hole of ½ in. diameter in the top of the retort at a point equivalent in position to the centre of a 20-ft. retort. The broken curves show in comparison with the control curves the changes in volume and calorific value resulting from the hole in the retort. It will be seen that, whereas the volume peak is reduced at the commencement of carbonization, due to the loss of the rich gases through the hole in the retort, the volume is increased throughout practically the whole of the remaining period of carbonization. This is probably due to more rapid carbonization taking place as the result of the scouring action of the furnace gases pulled into the retort, and to the furnace gases themselves. On the other hand, the calorific value of the gas is lower throughout the whole period of carbonization, the calorific value of the final gas being 482 B.Th.U., as against 532 B.Th.U. in the control experiment. The remarkable observation to be made, however, is that the manufacture of gas does not stop at the tenth hour, for at this period there is being produced about 700 c.ft. per hour of a gas of 180 B.Th.U. per c.ft. This gas is producer gas, as will be seen from an examination of the analysis curve and analysis model (fig. 10). A comparison of these curves with those

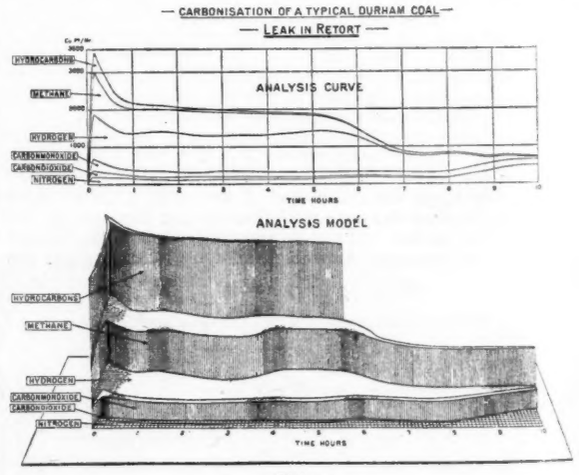


Fig. 10.

obtained from a normal carbonization demonstrates most clearly the actual differences in yields of the various constituents of the gas. The most interesting section of the analysis curve is that relating to the last few hours of carbonization, where the effect of the producer gas reaction is clearly shown. The large increase in the nitrogen content of the tailing-off gas is to be expected, but it is surprising that the time of contact in the retort is sufficient to convert the carbon dioxide of the waste gases to carbon monoxide, at the expense of the coke.

The thermal yield of gas is about 75 therms per ton, but will be dependent upon the time the charge is allowed to remain in the retort. It is a very difficult matter to determine what is the precise thermal yield of true coal gas under these conditions of carbonization, for it would be required to know at what stage of the process the producer gas reaction commenced. Rough calculations from the analyses show, however, that 1 to 2 therms of true coal gas have been replaced by producer gas therms; and it is possible to obtain results apparently superior to those

obtained in normal practice with tight retorts by continuing the carbonization process and increasing the quantity of producer gas formed. It would, however, be a far more economical process, if it be desired to admix producer gas with coal gas for the purpose of dilution, to manufacture the producer gas in the producer itself, and to add it under control (of course, preferably through the charge itself) rather than to cause the reaction to take place as the result of the indiscriminate admission of waste gas through holes or cracks in the retort, the heat required for which reaction is supplied through 3 in. of fireclay. The manufacture of producer gas from waste gases in a gas-retort is a costly process. It will thus be seen that by manufacturing coal gas in a pierced retort it is possible to obtain an excellent thermal yield of gas, and, in addition, a volume yield which might be very useful to manufacturers who continue to sell on a volume basis.

Before leaving the subject of the effect of a ½-in. hole in the retort upon carbonizing results, it should be noted how different must be the results obtained from retorts in which there exists a larger or smaller hole than that which is chosen by us, or where the holes are at points different from that in the foregoing example. It stands to reason, for example, that a hole in the retort in close proximity to the ascension pipe would not give conditions conducive to the producer gas reaction. There is but one conclusion to be arrived at, and that is that in the interests of high gaseous thermal yields, all retorts should be maintained in a high state of repair. If it is desired to admix water gas or producer gas, it is certain that this is best done by its admission through the charge as it is undergoing carbonization, or, failing this, by subsequent admixture; but it should always be done under perfect control, and by means of a regulating valve.

Admission of Air to Hot Gas.

However great the disadvantage of drawing into the retort waste gases from the retort setting, the admission of air to the gas before it has cooled below the ignition point of all of its constituents is more than ever to be avoided. Before, however, passing to the results of admitting a small quantity of air to the gas before it passes into the ascension pipe, it may be of some interest—perhaps mainly academic—to note the effect of allowing a small current of air, as distinct from waste gases, to enter into what would practically be the centre of a 20-ft. retort. The air introduced eventually does considerable damage, as may be seen from an examination of the analysis curves and model (fig. 11). The destruction of the hydrocarbons by the introduction of oxygen is indicated by the high carbon-dioxide content of the gas throughout the whole period of carbonization, while the producer-gas reaction appears to proceed in much the same way as in the pierced retort. The total yield of hydrogen is smaller than in the case of the introduction of waste gases, while the high nitrogen content of the tailing-off gas is again an outstanding feature of the curve. The final result of the procedure is to manufacture 17,300 c.ft. per ton of coal carbonized; the calorific value of the gas being 419 B.Th.U. per c.ft., and the thermal yield about 70 therms per ton.

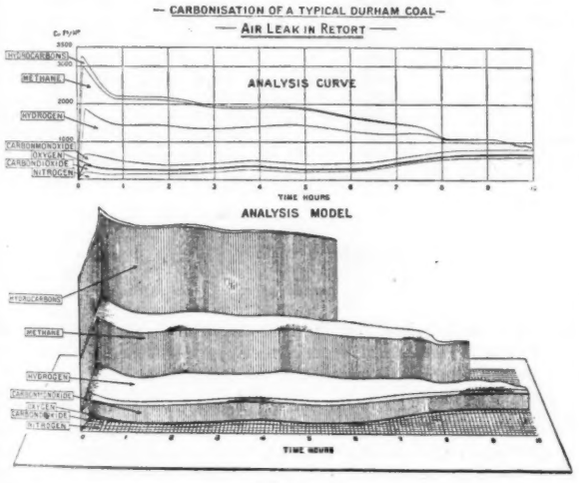


Fig. 11.

A yield of 70 therms per ton is far from a poor one; but if this coal were carbonized in a tight retort, and there were added such a proportion of producer gas as was made during the carbonization process in this example, the final result would probably be at least 75 therms per ton. It may be imagined that what has actually happened is that about 5 therms per ton of coal have been destroyed in the retort, reducing what would have been a 73 therm yield to 68, but that some two therms of producer gas have been added at the expense of the burnt-out products in the retort. The real conclusion to be drawn from an experiment of this nature is that the gaseous thermal yield per ton of coal carbonized is, when taken by itself, no indication whatever of the efficiency of the process or of the degree of conservation that has been practised.

Effect of Leakage in the Retort Mouthpiece.

In order to determine the effect of admitting a small quantity of air into the gas before it passes into the ascension pipe, one door in a through retort was wedged with a ½-in. distance piece, whereby a mean slit of $\frac{1}{64}$ in. was produced over the whole door joint. A totally new set of conditions is experienced by allowing a small quantity of air to be introduced at this point. The volume curve (fig. 12) again shows that a quantity of rich gas is lost in the initial stages of carbonization, while the volume of gas obtained during the last few hours is considerably increased. This is now due to a multitude of reactions which are taking place in the ascension pipe. The calorific value of the gas is also appreciably lower than that obtained under normal conditions. The analysis curves and model (fig. 13) show that a very different set of reactions must have occurred than in the foregoing examples of leakages. The two outstanding points to be observed in the analysis model are that the hydrogen yield has appreciably decreased, particularly towards the end of the process, due probably to its conversion into water vapour by combustion in the ascension pipe, while the oxygen content of the final gas is practically the same as in gas obtained from a tight retort. The disappearance of oxygen is an indication that combustion must have taken place to an appreciable extent. It is undoubtedly true that air drawn in at the retort mouthpiece is capable of producing the combustion of gas and tar in the ascension pipe. By this means, higher temperatures are attained in the ascension pipe itself, which is, in consequence, converted into a tar distillery, and it is beyond the wit of man to unravel the nature of the reactions liable to be taking place therein. The author suggests that one of the main causes of stopped pipes is the introduction of oxygen, and the conversion of the ascension pipe into a tar still for the manufacture of pitch.

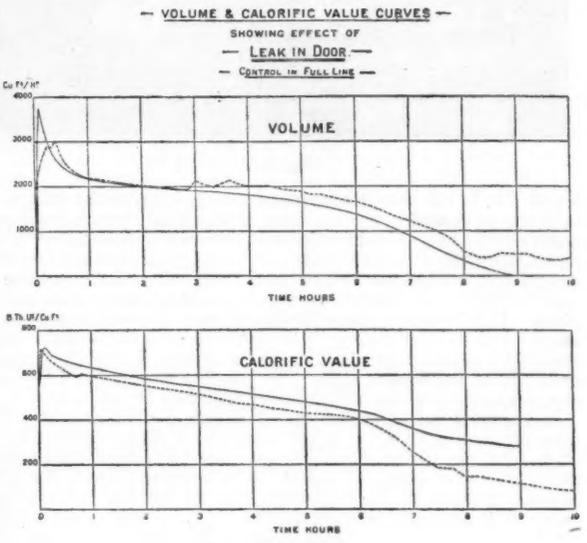


Fig. 12.

With the introduction of air into the gas at the ascension-pipe end there is again an increased volume of gas produced—15,550 c.ft. per ton—and once again the therm yield is far from poor—viz., of the order of 70 therms per ton. In this case the destructive effect of combustion in the ascension pipe has been partly replaced by the distillation and cracking of tar. Once again it is

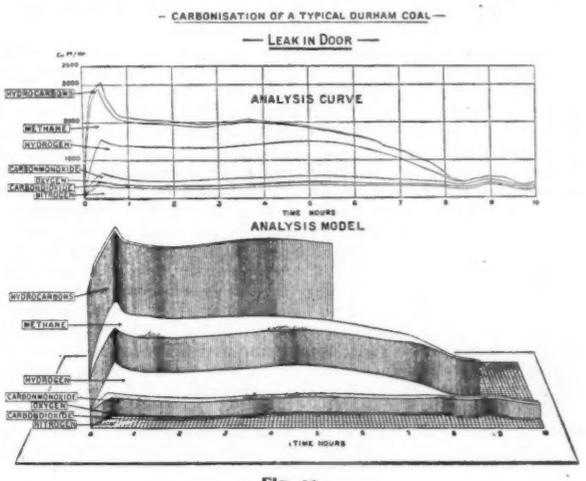


Fig. 13.

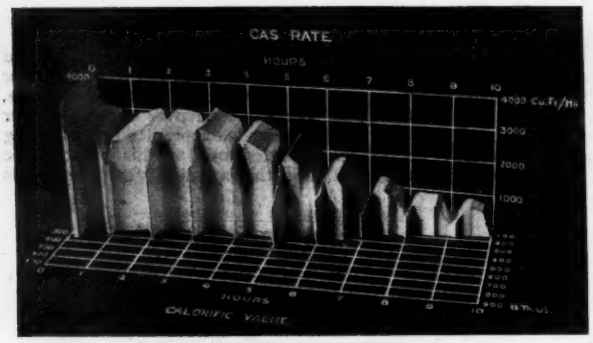


Fig. 14.

impossible to tell you of the loss of true gas therms by this process of combustion in the ascension pipe. That there has been a considerable loss is evident from the curves and models. The outstanding disadvantages which accompany this method of procedure are the disastrous effect upon the quality of tar produced and the additional retort-house cost incurred by reason of stopped pipes. It follows that these disabilities must proceed to a similar degree with a retort door or fitting possessing a slight leak; and the little puff of smoke which may be seen issuing from the retort mouthpiece, and which stops after the first few hours, does not represent the total loss and difficulty that may be incurred.

It has been demonstrated that destruction of gaseous therms takes place with a pierced or porous retort or a badly fitting door or, in fact, any unsound fitting on the vacuum side of the retort-house governor, which allows air to be admitted before the gas has cooled down to the temperature of the ignition point of its own easily-combustible constituents. Yet, on the other hand, you have seen that the therm yields under these conditions are not too unsatisfactory; but it has been demonstrated that the gaseous therm yield, when taken alone, does not represent the efficiency of the process or the degree of conservation practised. This is due to the fact that, whereas the introduction of furnace gases through the coal charge has a beneficial effect on the therm yield, there is always the possibility that, through the holes by which the scouring inert gases enter, there may escape the richer gases produced in the earlier stages of carbonization. It is evident, therefore, that the highest thermal yield in the form of gas is to be obtained by carbonizing in the soundest possible retort. Now it is impossible to imagine that in the very best conducted works all retorts are maintained in a state of first-class repair. Having to assume from our present knowledge of fireclay materials that retorts must be expected to develop cracks or holes, the best means of obtaining the highest thermal yields from a setting in a bad state of repair will be to operate each retort according to its condition. This will necessitate varying the vacuum maintained during carbonization to a different degree in each retort; and the possession of a device to effect this would carry with it many other advantages which need not be analyzed at the moment.

Fig. 14 shows how disastrous may be the result, in the case of a pierced retort, of the practice of bringing the vacuum to level when the retort doors of a section are open for discharging and charging. The thermal model, the analyses curves, and analysis model (fig. 15) really need no further comment. At each period of releasing the vacuum a large loss in volume is realized, and the curves become almost mountainous. The thermal yield of gas in this circumstance was as high as 74·6, and the calorific value of the gas below 400 B.Th.U. per c.ft.

One point to be noted with regard to the thermal models relates to the varying volume of gas made immediately subsequent to closing the retort door, as exemplified by the different heights

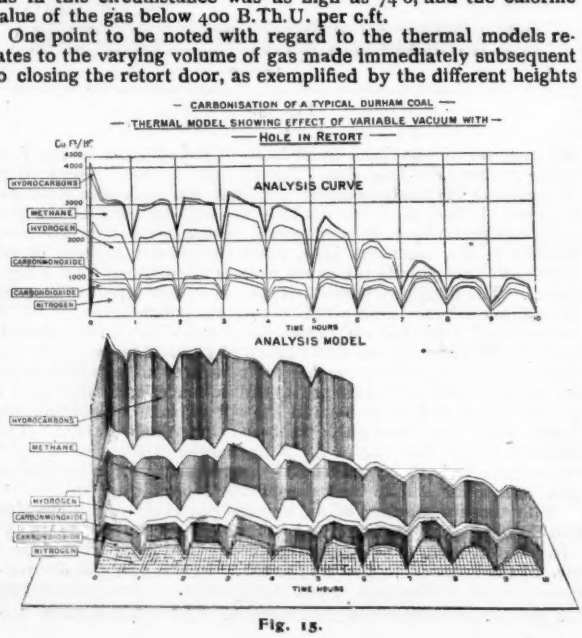


Fig. 15.

assumed by all these models. It has been found that the volume of gas produced is determined by the temperature that the retort itself has attained during the interval between discharging and recharging. The temperature of the walls of the retort mounts rapidly after the withdrawal of the charge, due partly to the increased rate of heat transmission which occurs and to the fact that retort carbon is burned by the inrushing air through the open door. Apart from many other reasons why it is advantageous to recharge the retort and close the door as rapidly as possible, this is given as one which is not usually appreciated.

Unmanageable Retort Houses.

Finally, it is interesting to attempt to realize how uncontrollable becomes the carbonization process by allowing the retort-house to fall into disrepair, or by attempting to utilize unsuitable plant and machinery. The condition of the retorts, some of which may be scurfed, while others require scurfing, will present different degrees of porosity, and either loss of gas or the producer gas reaction will take place, according to the length of time the charge has remained in the retort, and the position of the hole in the retort. Many retorts are controlled by one governor; and the conditions under which the retorts are operated must be the same, though retorts in bad condition require an entirely different degree of pull from those in good condition. An unequal distribution of heating gas in the setting not only causes certain retorts to be maintained at appreciably different temperatures, but produces in any one retort an unequal heating effect. No system of control can attempt to cause individual retorts to be operated according to their condition, or age, or to the evenness and degree of their heating, or the lie of the retort charge, or the tightness of the retort door and yet the influence of these factors, not only on the nature of the gas made but upon the thermal yield of true coal gas, is very appreciable.

As a chemist, the author is not displeased to find chemists well established in the retort-house; and in a well designed and conducted house they can save large sums of money, but are incapable of serving any useful purpose in a retort-house which manages itself by virtue of its uncontrollable conditions. This picture is perhaps drawn a little drastically, but it is substantially true; and the retort-house chemist or foreman—or whoever may be responsible for efficiency—obtains the best result circumstances allow. With carbonizing conditions only partly under control, the process becomes an art, or a knack, or an acquired additional sense, and the author has seen some fiue old artists in the form of retort-house foremen work miracles in the management of "unmanageable" retort-houses. The ancients fired some wonderful pottery, fabrics may be dyed in a beautiful way by natives with vegetable dyes applied in the crudest ways, and an observant cook may prepare an excellent dinner with half the burners of a gas-cooker stopped up with fat and grease; but all these methods are costly, and the percentage of failures is high. The carbonization of coal becomes a science only when the reactions taking place, and their efficiencies, are carefully controlled by the chemist; and this is possible only when the engineer instals a first-rate retort-house, and maintains it in a first-class condition.

STREET LIGHTING.

By W. J. Liberty.

[A Paper read before the First Conference of the Institution of Public Lighting Engineers and Superintendents, held at the Holborn Borough Council Offices, London, on Feb. 15.]

"Street lighting" is a wide term. It can be described as "good lighting," "bad lighting," "indifferent lighting," and "no lighting at all" when the silver orb which is supposed to shed her rays upon mankind in general and the public highways in particular hides her brilliance behind banks of clouds, to the consternation of those who have to use those highways. It is also a more general term than formerly, being bound up with other modern factors—viz., transport, traffic control, safety.

With the ever-growing volume of high-speed mechanically propelled traffic, with its danger to life (there are those present to-day who can give statistics on these matters) not only in our large cities and urban centres, but in our rural districts, the roads of which are largely used at night for transport purposes, good lighting might in my opinion be a candle in a lantern, an acetylene flare, or a cheap petroleum lamp (of which there are many on the market) set up at the fork or junction of several roads, at a nasty corner or concealed turning. A lantern attached to any signpost illuminating the otherwise undecipherable lettering would be a perfect godsend to a stranded motorist or lorryman, for, in addition to expediting their journey, it would often be the means of saving valuable lives. In the absence of gas or electric facilities outside cities and towns (the illuminant does not count, it is the illumination that matters) such a light would be "good lighting"—efficient and inexpensive.

"Bad" or "indifferent" lighting is common and apparent to all attending to day's conference. Coming, as you do, from all parts of the kingdom, you have had many opportunities of observing (perhaps not in your own cities and districts) badly placed, spaced, and maintained lighting; the reason being that it is no particula person's duty to look after this important work. Under the Watching and Lighting Act of 1833, after its adop-

tion by the parish council in open meeting, the work may be entrusted to the "first fireman" or chief constable (excellent persons in their own particular line); or, to one who has many and multifarious duties to perform, this one is added, often to his chagrin. In the cities and larger towns the work is often under the control of the engineer or surveyor, who is in most cases overburdened with important work, and, being unable to work by night as well as by day, has perforce to relegate it to others, whereas cleansing, sanitation, and sewers have each their properly qualified officer. All this militates against good lighting.

To light a city or town well, considerable forethought should be given to questions such as the grading of streets from a traffic point of view, through traffic where expedition and celerity are necessary, slow moving traffic, stationary traffic in streets filled with warehouses and railway vans (and therefore liable to be filled with shadows), small streets with dwelling houses, crooked lanes, courts, and cul-de-sacs (many of them filled with valuable merchandise—such as at the docks, quays, and rivers—while others are the abodes of slum dwellers, houseless workers, and ofttimes criminals). In such latter cases no specific rule of spacing can be laid down—every lamp being equal to one constable.

In addition, the width of the streets (both roadway and footpath), central roadway lighting, "staggered" posts on the pavement, or centrally suspended lamps have to be considered. For main roads of 100 ft. in width, used for through traffic, I would suggest tall standards 25 ft. 6 in. in height, about 175 ft. apart, down the centre of the roadway. These assist in keeping the traffic in line, and prevent "jockeying" by impatient drivers; the rests being little "cities of refuge" for distracted pedestrians. Holborn, Holborn Viaduct, and Farringdon Street, where such standards with 4000-c.p. "Excello" electric lamps thereon, the columns being fitted with lowering gear, fulfil these conditions admirably, as likewise the central roadway lighting of Regent Street with columns 20 ft. in height to burner level fitted with 4000-c.p. high-pressure "Keith" gas lamps.

Thoroughfares 80 ft. wide, with fast through traffic, should be lighted partly by standards on the footway, and partly central road lighting; the refuges guiding traffic and aiding foot passengers. I would suggest standards 13 ft. 6 in high, the lamps 100 ft. apart and staggered. This is a generous illumination with a light source of 1000 candles per unit; but traffic in the evening demands it.

In roads 50 to 60 ft. wide I would suggest central suspension lighting at a height of 27 ft. 6 in. above the centre of the roadway; the lamps being 150 ft. apart. This would give practically a shadowless roadway in the rush hours. At midnight each other lamp (if arranged in circuits) could be extinguished; while, if gas, each other lamp could be turned off from a cock on the wall service. Advantage could be taken of the junction of the thoroughfares to suspend the lamp over the centre, thus diffusing the light down the cross streets, enabling the small lamps to be extinguished for some considerable distance, breaking the difference in the brightness of the main road and the feebler lighting of the smaller streets, and abolishing what one might describe as relative darkness. This has been carried out in actual practice. I might add that the lamps, whether electric or gas, should have raising, lowering, and travelling gear to bring the lamp down to the footpath.

In side streets 30 ft. in width, superheated double burner inverted mantle gas-lamps or twin bulb metallic filament or gasfilled lamps shaded, staggered 100 ft. apart on brackets 11 or 12 ft. in height, to free the footways, should be used. These would give a very even result; while for lanes 15 ft. in width a single superheated gas-burner, or a 75-c.p. electric metallic filament bulb in a suitable lantern on brackets spaced at 90 ft. (height 11 ft. from pavement level to light source) should be ample and sufficient. In courts and cul-de-sacs I would place brackets with 1-unit lamps irrespective of spacing, to cut out all shadows and lurking places. This has been my invariable practice.

In large traffic centres like that in front of the Mansion House and the Royal Exchange, high-power gas and electric arc lamps of 3000 c.p., on columns upon refuges, are found most suitable. When one considers that no less than 29 000 vehicles passed this spot in one day of 12 hours—viz, 8 a.m. to 8 p.m.—in 1922, while in 1923 the number had increased to 31,000 vehicles, representing 86,046 tons, per day, the need for such treatment is apparent.

Chief Constable Bassom, Director of Traffic Services, gives the number of vehicles passing various points between 8 a.m. and 8 p.m. on a corresponding selected day in 1922 and 1923 as under:

—	1922.	1923.
Hyde Park Corner	51,000	56,000
Piccadilly Circus	40,000	41,000
Trafalgar Square	38,000	42,000
Blackfriars Bridge (N. side)	20,000	29,000

The increase is more marked still over a period of years:

—	1904.	1923.
Hyde Park Corner	29,000	56,000
Piccadilly Circus	27,000	41,000
Trafalgar Square	27,000	42,000

Thus are bound up the questions of lighting and traffic, and safety too, for, in the dark days of winter—when, with very little warning, areas like that in front of the Mansion House and the northern end of Blackfriars Bridge are plunged into darkness, while the volume of traffic still rolls increasingly on—the need for good artificial lighting is absolute, and the lamps are immediately lighted, whatever the time may be.

When in 1908 the City Authorities decided to relight their area, scrap the old system, and sweep away all obstructions in the nature of lamp standards, the roads and streets were measured, and plans prepared not only of each thoroughfare, but of each lamp position, before finally settling upon the fixing. This took nearly two years of continuous work, with the result that the lighting is about as perfect as can be.

Cheapside may seem to be somewhat brilliant and slightly spectacular; but it should be remembered that it is the shopping thoroughfare of the city, and half the lamps are extinguished at midnight. Though brilliantly illuminated, the thoroughfare is devoid of glare, owing to the scientifically designed prismatic reflector or dioptric lens, thought out by Mr. Beard, of the City of London Electric Lighting Company. This lens is especially designed and cut, to enable all upward and other useless rays to be picked up and used in the horizontal direction, so that the street is absolutely shadowless from end to end. As one walks down the centre of the roadway a paper can be read, a pin seen on the road surface, and the numbers of the motors travelling at a fast rate at night, when the street is clear, can be read with ease.

Glare.

The question of "glare" in connection with public lighting has been much written about, and is still a controversial subject. With the increases of the intrinsic brilliancy of light sources, as new methods, inventions, and lamps are brought out, more attention will have to be given to it. Especially if the question of "relative darkness," caused by the difference in illumination in the main and subsidiary streets, is to be abolished.

The causes of glare can generally be attributed to the direct exposure of the optic nerve to some intrinsically brilliant unscreened light source. To give an idea of the growth of the intrinsic brilliance of light sources, I quote from a very useful table given by Dr. J. S. G. Thomas in a paper which he read before the Roads and Transport Congress (1921) on Public Lighting, on behalf of the Distribution Department of the South Metropolitan Gas Company.

Luminous Source.		Intrinsic Brilliance C.P. per Sq. In.
Moon		2
Sky (average brightness)		2·5
Candle		2·5
Petroleum lamp		5
Gas-burners	Flat flame	2 to 5
	Argand	7 5
	Acetylene	10 to 25
	Low-pressure incandescent	40
	High-pressure incandescent	250
Electric lamps	Carbon filament	400
	Tungsten metal filament	1,100
	Gasfilled	5,000
	"Pointolite"	12,900
	Electric arc (naked)	20,000
Sun		800,000

The intrinsic brilliancy is given in candle-power per sq. in., and shows the great increases from natural average brightness of the sky at 2·5 candles, through the various forms of oil, flat-flame gas, high-pressure gas, to the naked electric arc at 20,000 c.p. The effect of glare can be entirely avoided by screening the light sources so that the eye is not directly exposed to them. This was found possible in Cheapside in the early days, when, with the 12½ amp. "Oliver" arcs (nominally 3000 c.p.) with clear outer globe and a prismatic lens at 15°, the value was 3600 c.p., by making the globe opalescent with a frosted band to obscure 15° angles, and by placing the dioptric relector in the direct rays the candle-power was reduced to 2000, the disagreeable scintillations that meet the eye at this angle vanished, but the illumination in the street did not suffer.

The following table gives the candle-power at 15°, 40°, and 55° with various degrees of opalescence or etching:

12½ Amp. "Oriflame" Arcs.

—	C.P.		
	15°.	40°.	55°.
(*a*) Fitted with ordinary light opalescent outer globe	1400	2600	3200
(*b*) With clear outer globe and "Beard" prismatic reflector	3600	2350	2600
(*c*) Opalescent outer globe without reflector	2200	3300	3500
(*d*) Frosted globe without reflector	2300	3000	3000
(*e*) Frosted band to obscure 15° dioptric reflector	2000	..	..
(*f*) Very slightly etched all over	2140	..	..
(*g*) Semi-opalescent with reflector	2100	..	..

Street Lighting Specification.

The question as to whether a street lighting specification cannot be settled by candle power at the light source, but by illumination on the road surface, in foot-candles or some other term, will remain a fruitful topic of discussion. The measurement of the light, the classification of the streets, and the illumination basis will form the groundwork of such a specification.

SOME NOTES ON THE LUBRICATION OF GAS WORKS PLANT.

By W. T. KENSHOLE, of Lea Bridge.

A Paper read before the London and Southern District Junior Gas Association, on Feb. 22.]

In order to reduce the number of breakdowns to a minimum, and to secure high efficiencies, combined with low maintenance costs, it is of great importance that the lubricating systems of engines and machinery be as perfect as possible, that the correct grades of lubricant be employed, that these be stored and distributed in the best manner, used in the right way and in the correct amount, and that the waste oil, if any, be collected, purified, and used again.

The field covered in a modern gas-works is so large, embracing as it does the lubrication of steam engines, steam turbines, gas-engines, electric generators and motors, gears, wire ropes, &c., that I only propose to deal briefly with: 1. The steam engine. 2. The gas-engine. 3. The steam turbine. 4. The control of lubricants.

THE STEAM ENGINE.

External Parts.—The lubrication of the external moving parts, comprising the crank, crosshead, guides, main bearings, eccentric, &c., is fairly easily controlled, as these parts are under observation and can be easily examined. The rate of feed of oil can be seen, and, therefore, with careful attention the oil can be regulated to the minimum required for efficient lubrication. The lubricant used is generally a straight mineral oil, and is as a rule used only once. It is, therefore, not subjected to any severe strain, such as when employed in a circulating system.

The various systems by which oil is applied to bearings may be divided into seven main groups: Hand oiling, drop-feed oiling, pad or wick, ring, bath, splash oiling, and circulation oiling (either by gravity or by forced feed).

Bearing troubles are usually indicated by the tendency of the bearing to heat up. One cause is dirty oil; and the following precautions should be taken.

1. Barrels should be stored under cover, and not left in the open exposed to sun and rain.
2. When filling cans, the oil should be passed through a filter.
3. Oil cans and oil feeders should be provided with screwed stoppers and covers to prevent dirt getting in.

It is most important that all cans should be distinctly labelled, so as to reduce the risk of the wrong oil being used.

INTERNAL PARTS.

The internal moving parts comprising the valves, valve spindles, piston, and piston rod are exposed to the effects of high temperatures; and, with the exception of parts of the piston rod and valve spindle, these internal parts are not exposed to view, so that the conditions of lubrication cannot easily be inspected. The internal lubrication of steam cylinders and valves is, therefore, more difficult to control than that of the external moving parts, and if they are not properly lubricated, extra wear and tear is the result. The object of internal lubrication is to form a film between the rubbing surfaces, and thus replace metallic with fluid friction, and to form an oil sealing film in order to prevent leakage past the valves, piston rings, and gland packings. Efficient lubrication permits valves and pistons to operate quietly and without vibration; and gland packings will not require renewal or adjustment so frequently, for the oil will maintain a complete film, preventing wear and assisting to seal the gland.

In order to lubricate the internal parts of the cylinders and valves, oil has to be introduced at one or more of the following points: (*a*) To steam chest. (*b*) To valves. (*c*) To gland packings of piston rod and valve spindle; these by direct system. (*d*) To steam line, by indirect system.

In the direct system the cylinder oil is introduced by means of some form or other of hydrostatic lubricator. These lubricators are not automatic. It is difficult to maintain a uniform feed of oil, especially where a very small feed is required, for the rate is affected by the change in viscosity of the oil at different temperatures. Consequently, the feed varies each time the lubricator is filled, and with the changes of temperature in the room.

In the indirect system, the principle is entirely different. The cylinder oil is fed into the steam line by a mechanical lubricator driven from some moving part of the engine. The oil is forced from the lubricator through a pipe to a spoon-shaped atomizer, which usually has about four slots cut in it, and should be fitted in the centre of the steam pipe. The steam, impinging against the atomizer, forces the oil through the slots, which becomes thoroughly broken up and atomized. With this type of lubricator, once the feed is set, it must remain constant to the speed of the engine so long as there is oil in the lubricator, even though there be wide variations in temperature and pressure.

Steam engines are usually designed to run at constant speeds. Under full load conditions the velocity of a large volume of steam passing to the cylinder atomizes the oil and distributes it all over the cylinder and valve faces. Under light load conditions the volume and velocity of steam passing to the cylinder are much reduced, and therefore the steam has not the same ability to atomize the oil.

The consumption of cylinder oil is affected by certain conditions, briefly enumerated as follows:

(*a*) Large-size engines require less cylinder oil per B.H.P. than small engines.

(*b*) Horizontal engines require more cylinder oil than vertical engines, as in the latter there is no pressure between the piston and cylinder walls except that exerted by the piston rings. It is always an advantage to have the corners of the latter rounded, for when they are sharp they act as scrapers on the cylinder walls, and destroy the oil film.

(*c*) Large horizontal engines without tail rods require more oil than engines with them, as they help to support the weight of the piston.

The greater the steam pressure, the higher the temperature; but the oil consumption is not influenced greatly by either of these, provided the correct grade is used. Speaking generally, other conditions being equal, the consumption need not be more when superheated steam is used. Wet saturated steam means an increased demand for cylinder oil, as there is a tendency to wash-off the film.

SELECTION OF THE OIL.

The correct grade of oil to be used is determined by taking into account the size of the cylinder, the stroke, the load, the steam pressure, and character of the steam—whether wet, dry, or superheated. If the oil is too heavy in body, it will not distribute evenly over the internal surfaces of the cylinder—resulting in high consumption, and encouraging the formation of deposits, especially under high pressure and superheat conditions. Again, should the oil be too light in body, it will not withstand the pressure between the rubbing surfaces—once more resulting in heavy consumption and extra wear and tear. In our case, we originally used only one grade of cylinder oil; but for the past two years we have used three totally different ones. The first grade is used in cylinders of exhauster engines, generator engines, &c.; the second for washer-scrubber engines, boiler feed pumps, &c.; and the third for tar and liquor pumps, and where exposed to weather conditions.

THE GAS-ENGINE.

The lubrication of small and medium-sized gas-engines may be classified under three main headings: 1. The old system. 2. The improved system. 3. The positive system.

The Old System.—In this, the main and cam-shaft bearings are generally ring oiled; the oil being raised from a reservoir to the top of the shaft, where it spreads and lubricates the bearing surfaces before returning to the oil reservoir. The piston and gudgeon pin are fed from a sight-feed lubricator. The crank pin bearing is lubricated by an arrangement which makes use of centrifugal force; the oil being fed to the hollow ring or disc from a sight-feed lubricator. The valve spindles, cams, and governor are fed by hand.

The Improved System.—In this, the main bearings, cam-shaft bearings, crank-pin, and valve spindles are lubricated in the same manner as above. The improvement lies in the provision made for the independent oiling of the piston and gudgeon pin. A sight-feed lubricator supplies oil to the piston and piston rings; the oil being delivered in such a position that, when the crank is on its forward centre, oil is delivered within a short distance of the inner end of the piston. The lubricator is fitted with a check valve to prevent "blow back" of gases, and the oil is fed through a tube to a distributor, where it is wiped off by a catcher, and led through a tube to the gudgeon pin bearing.

The Positive System.—In this system, oil is uniformly fed to the piston, crank, gudgeon pin, and exhaust valve spindle from a mechanical lubricator operated from the cam-shaft. The main bearings are ring oiled, and the cams and inlet valve spindle, governor, &c., are lubricated by hand.

SELECTION OF THE OIL.

The lubricating oil used in small and medium sized gas-engines has an important bearing on their operation. The frictional losses in these engines amount to from 12 to 25 p.ct. of the rated horse-power, regardless of the actual load upon the engine. This can be reduced to a minimum by the use of a suitable high-grade oil, which results in minimum cost for renewals and repairs. The correct grade of oil to be used is determined by taking into account the quality of the gas, the piston clearance, the number of rings (whether pegged or not), the temperature of the water jacket, the method of lubrication, and any special mechanical and operating conditions. It should be borne in mind that a temperature of between 2000° and 2600° Fahr. is developed in the cylinder at the instant of explosion; the average temperature of the expanding gases being about 1400° Fahr. The average temperature of the cylinder walls ranges from about 200° to 300° Fahr., and that of the exhaust gases up to about 700° Fahr. The temperature of the cooling water at the outlet of the cylinder jacket should not be less than 100° or more than 140° Fahr.; the ideal temperature being about 120° Fahr.

Unsuitable oils generally darken in colour, increase in specific gravity and viscosity, and become acid, due to oxidation. The temperature will always be high, thereby increasing the rate of oxidation and shortening the life of the oil. Should the oil be too light in body, it will break down under the influence of the high temperature in the cylinder, losing its sealing power, causing excessive wear of piston and liner, and tending to form excessive carbon deposits. Should the oil be too heavy in body, it

will not spread over the surface of the piston and cylinder easily —again causing excessive wear of the piston and liner, and tending to form excessive carbon deposits.

Deposits arise from one or more of the following causes: Dust or dirt in the intake air, impurities in the gas, soot from incomplete combustion (due to poor ignition or faulty valve timing), overfeeding of oil, and overheating from faulty water circulation. The deposits, under certain conditions, lead to back-firing and pre-ignition, pitting of the valves, and loss of compression—resulting in loss of efficiency. It is, therefore, most important that the air filter, usually consisting of cocoanut matting, should be kept thoroughly clean, to ensure the filter functioning properly, the water jacket kept cool by good circulation of clean water, and the supply of oil cut down to the minimum consistent with efficiency.

The Horizontal Steam Turbine.

There are two principal methods of turbine lubrication:

Oil circulation, and ring-oiled bearings.

It is essential that the correct high-grade turbine oils should be used in steam turbines, as these are the least affected by air, water, and other impurities with which the oil comes into contact. With poor oils the bearing temperatures are always high, and the rate of oxidation of the oil is increased, thus seriously shortening the life of the oil. Moreover, they often leave deposits in the oil piping and passages, thereby impeding free circulation, and causing pitting of the bearings. When it is remembered that in a circulating system of a steam turbine the oil is forced through the bearings under pressure, then collected, filtered, cooled, and returned to undergo the same severe service, it can be seen that it undergoes a very severe strain. At the same time it is subjected to the action of air and heat, solid impurities, and water.

After a turbine has been started, the oil temperature gradually increases, and finally becomes constant after about four hours running. The turbine shaft becomes hot by conduction, on account of the high temperature in the steam casing. This, together with the frictional heat, raises the temperature of the oil. Most of the heat absorbed by the oil is removed by means of an oil cooler; and the resultant temperature depends partly on that of the water used, but principally upon the capacity and size of the coils or tubes of the cooler. It is of the greatest importance that the water in the coolers should be as clean as possible, to prevent the formation of deposits. The temperature of the return oil from the bearings should not be more than 130° Fahr.

Deposits.—These occur even where the best oils are used; the principal causes being: 1. Water. 2. Solid impurities. 3. Air. 4. Adding new oil.

The effects of the above are:

1. Water has an emulsifying effect, forming a thick sludge. This is most objectionable, as it tends to clog the filters, strainers, &c., causing a sluggish flow of oil.
2. Solid impurities have a disintegrating effect.
3. Air has the effect of oxidizing the oil; the rate increasing rapidly for temperatures above 140° Fahr.
4. Where no water enters the oil, and practically no waste or leakage occurs, and the amount of new oil added as "make-up" is very small, the oil generally darkens in colour, and acidity arises.

Generally speaking, turbine oils are of low viscosity, with a specific gravity of about 0·870. With such oil, the following qualities would be expected:

1. Low frictional losses.
2. Rapid removal of heat from turbine bearings.
3. Rapid cooling in oil coolers.
4. Quick separation of water, dirt, and other impurities.
5. Long life.
6. Freedom from trouble.

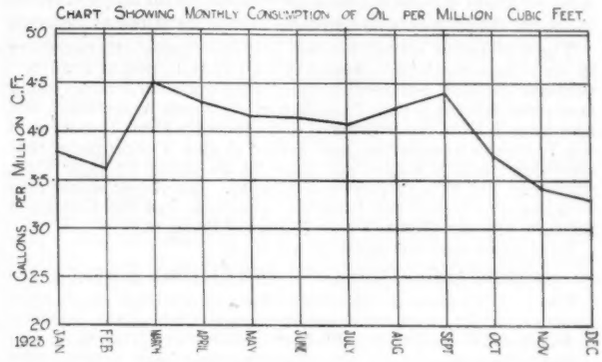
In some cases an oil vapour comes from the bearings, in spite of the fact that the bearing temperatures are normal. This is usually caused by the oil being heavily charged with air bubbles, due to the high speed at which it is circulated through the bearings and oil pipes. When the oil is released, the air bubbles rise to the surface, and, in bursting, produce very fine spray or vapour.

Control of Lubricants.

Having selected the correct grades of oils for the various purposes, it is of the utmost importance that the storage and distribution of the lubricants be properly cared for, and run on systematic and efficient lines; otherwise a great deal of loss may result. The practice at the author's works is as follows: The various grades are delivered in barrels; they are immediately numbered according to the grade of oil which they contain, and stored away from the effects of sun and rain. They are taken to the oil stores as required, where they are fitted with large-bore taps, and placed on racks. These taps are of special construction, having a clean "cut-off," so that a minimum dripping of oil takes place when they are shut off. A special key has to be used for operating them. The oil stores are open for the issue of oil for a definite period every morning, when the oils required for use in the various places are measured-out into labelled cans fitted with screwed stoppers. These issues are debited to the respective places in a book specially drawn up for the purpose, from which the totals are struck at the end of each month, when the total is checked by taking stocks.

The used oils recovered are collected every morning, measured, and returned to the oil stores, where they are dealt with according to their condition. Oils from certain plants have a fair amount of water mixed with them. Our method of dealing with these is to put them into a steam-heated settling tank, where the water is separated from the oil, the former being drawn-off by a tap. All recovered oils are filtered and used again.

The consumption of each grade of oil, also of the total oils used each month, is plotted on a chart.



It will be remembered that the immediate Past-President of our Association, Mr. D. C. Cross, in his Presidential Address, said that we entered into a contract in January, 1922, for the supply of all the lubricating oil required on an "output of gas" basis, paying a fixed price per million c.ft. of gas made each month. All the calculations were made on the previous oil consumptions. For every gallon of new oil saved as compared with the previous year, we shall receive a credit at the end of the year at a fixed basic rate per gallon. Everything is calculated on the gallons of oil used per million c ft. of gas made. There are several advantages under this new form of contract, including the advice of the Oil Company's engineers, who periodically visit the works, and the loan of mechanical lubricators and filters.

This form of contract has worked exceedingly well in our case. Some of the benefits may be seen in the accompanying table, which shows the consumption of oil from 1916 to 1923.

Year.	Total Gas Made. C.Ft.	Total Oil Used, Gallons.	Gallons per Million C.Ft. Gas Made.
1916	537,007,000	3258	6·06
1917	629,463,000	3819	6·06
1918	645,489,000	4663	7·22
1919	730,498,000	5651	7·73
1920	779,014,000	4397	5·64
1921	785,566,000	3976	5·06
1922	819,329,000	3583	4·37
1923	854,665,000	3376	3·95

The discussion is held-over for next week's "JOURNAL."

"The Story of Coal."

In view of the vital importance of coal to every inhabitant of these islands, the Mining Association of Great Britain have thought it desirable to tell the story of coal as shortly and as simply as possible. For this purpose they adopted the plan of issuing in the principal newspapers of the country a series of advertisements explaining certain aspects of the coal mining industry. The first advertisement of the series, which appears on another page of this issue, deals with coal as the foundation of the British Empire —in which position it has superseded wool. Succeeding advertisements will deal with such subjects as the cost of coal in human life, efficiency in management, the miners' working day, the cost of coal to the consumer, &c. Coal is not only an item of importance in our daily lives, both as consumers and producers—since nothing is bought or sold into the production or transport of which coal does not enter in some form or another—but it is also one of the great industrial, political, and economic questions of the day. The years since the armistice have shown only too plainly how these politico-industrial questions dominate our lives, and how little the statesman and the politician—let alone the man in the street or the woman in the home—know about them or about the disastrous results of interference with the delicate mechanism of modern industry. Such educational work as has been undertaken by the Mining Association can therefore do nothing but good, and is another welcome example of the new attitude of some of the great industries towards publicity and public opinion.

Midland Junior Gas Association.—A visit (open only to members) has been arranged for next Saturday afternoon to the Fort Dunlop Works of the Dunlop Rubber Company, Ltd. A general meeting of the Association will be held in the Council House, Birmingham, at 6.15 on Thursday evening, March 6, when a paper on "Gas Fires in Hotels" will be read by Mr. A. Whitehead, Technical Assistant, Fittings Department, Birmingham.

YORKSHIRE JUNIOR GAS ASSOCIATION.

A meeting of the Association was held on Saturday, Feb. 16, at the showrooms of the Corporation Gas Department, Bradford, by kind permission of the Gas Committee and the Engineer (Mr. Charles Wood). Mr. W. HEATHCOTE, of Halifax, the President, occupied the chair. The members rose in silent respect in passing a resolution of condolence with the relatives of the late Mr. G. W. Womack (Bradford), who had been a member of the Association.

The PRESIDENT stated that, owing to rearrangements necessary in the Association's programme, Mr. C. T. B. Roper, of Bradford, who was the Hon. Secretary of the Joint Council of British Junior Gas Associations, a Past-President of their own Association, and also former Hon. Secretary and more recently Hon. Treasurer of the Yorkshire Association, had agreed to give a short paper that afternoon; and a paper was also to be given by their Hon. Secretary, Mr. F. A. C. Pykett, of Halifax. Mr. Roper would deal with the activities of the Junior Associations and the Education Scheme, and Mr. Pykett with "Reported Escapes."

Mr. ROPER then delivered his paper on

JUNIOR ASSOCIATIONS AND THE DIPLOMA SCHEME.

The Joint Council of the Junior Gas Associations was formed about seventeen years ago, and its success has been largely due to Mr. A. L. Holton, of Manchester, who was the Hon. Secretary from its inception until 1917. Meetings have been held at least once per annum since, when various phases of the work of the Junior Associations have been discussed. It is not possible to go into details, so I will mention particularly three points which have had their origin in the Joint Council, and which, I think, very fully justify its existence.

JOINT MEETINGS.

The first joint meeting of the Junior Associations was held at the Manchester Gas Exhibition on Nov. 2, 1907, when those present had the opportunity and pleasure of hearing an inspiring address by the late Mr. Thomas Newbigging. The second joint meeting took place at the Franco-British Exhibition, in London, on Aug. 29, 1908, when the Juniors were again highly favoured, being addressed by Mr. H. E. Jones. The third meeting took place at Birmingham, in May, 1911, when the programme included visits to the different gas-works, and to typical Birmingham industrial works. The fourth meeting was held at Sheffield on June 14, 1913, when the Sheffield Gas Company hospitably welcomed the visitors, opened their different works for inspection, and secured visits to several works of the leading Sheffield firms. That year also provided the fifth meeting, which took place at the National Gas Exhibition at Shepherds Bush, on Oct. 18, 1913, in which a number of our Scottish confrères joined.

The war stopped these joint conferences; and it was not until February, 1920, that the most recent joint meeting was held at Birmingham, when a visit was paid to the British Industries Fair at Castle Bromwich. It is proposed that another meeting shall be held this year at the Wembley Exhibition; and, in view of the improved railway facilities now available, it is expected that a record gathering will assemble to see particularly that portion of the Exhibition devoted to the gas industry.

PUBLICATION OF THE "TRANSACTIONS."

The joint publication of the Transactions of the English Junior Associations commenced with the session of 1910-11; this effort being the direct outcome of the formation of the Joint Council. These volumes form a compact and valuable record of gas matters from 1910 to the present time. The original issues were very limited; and, as a consequence, many members of the gas profession would willingly give many times the face value for a copy of Vol. I. The work of the Council in co-ordinating the methods of the different associations has resulted in the introduction of the inclusive subscription whereby every Junior makes sure of a copy of the session's volume. Geographical and other difficulties have prevented the inclusion of the Scottish Junior Associations in our Council; but in 1922 the newly-formed Wales and Monmouthshire Junior Gas Association increased our ranks.

THE EDUCATION SCHEME.

As a result of correspondence with the Institution of Gas Engineers on the subject of education in the industry, the Joint Council formed, in October, 1918, an Education Sub-Committee, to meet representatives of the Institution. As a result, Mr. J. G. Clark, of the Gas Light and Coke Company, took part in many conferences with the Committee of the Institution of Gas Engineers and representatives of the Board of Education; and the introduction of the education scheme is largely due to his efforts. In 1921 an Advisory Committee was formed, comprising five representatives appointed by the Board of Education, three by the Institution of Gas Engineers, and two from the Junior Associations, to deal with the scheme.

Full particulars of the scheme were issued in the form of a pamphlet by the Institution of Gas Engineers in January, 1923. [See "JOURNAL" for Nov. 1, 1922, p. 289.] This also gives details of the supplementary scheme arranged by the Institution, to provide for those students who are not within reach of suitable technical institutions. Mr. Walter Hole has been appointed Organizing Secretary for the scheme; and a report of his address to the Midland Junior Gas Association on June 21, 1923, appears in our Transactions. [See "JOURNAL" for June 27, 1923, p. 800.] For those who wish to have more information on the subject, a report has been printed by H.M. Stationery Office, and therein the scheme is clearly outlined and detailed (Report of H.M. Inspector on Technical Training for the Gas Industry; price 3d.). Before the commencement of the next session we hope to be able to issue particulars of those technical schools which have prepared suitable courses approved by the Board of Education.

Comprehensive as the scheme is, there is still a large body of Juniors to whom it does not apply; and at the present time a scheme is being evolved dealing with the training of men engaged on the commercial and sales side of the industry. It is also hoped to prepare a suitable course for those who, while wishing to improve their knowledge, are not aiming for the higher positions in the industry.

Discussion.

Mr. H. WILDE (Bradford) asked whether it would not be possible to arrange an interchange of speakers for the meetings of the various Junior Associations.

Mr. ROPER replied that this matter had been raised at recent Joint Council meetings, and was receiving consideration.

Mr. J. W. HORWILL (Bradford) thought that the proceedings of the Joint Council meetings ought in some way to be communicated to the members of the Junior Associations. Under present conditions, the members as a whole had no idea of what was taking place.

Mr. J. BRIDGE (Elland), representative of the Junior Gas Associations on the Advisory Board for the Institution's Education Scheme, said a résumé of the proceedings of the Joint Council might well be submitted with each year's Annual Report. This was done in the case of the Manchester Junior Association.

The PRESIDENT said the Council of the Yorkshire Association would consider at their next meeting whether they should make any recommendation on this matter.

Mr. H. S. BOYES (Harrogate) inquired if the possession of the certificate as A.M.Inst.C.E. would have any weight in securing the Institution's Diploma.

Mr. BRIDGE said that an A.M.Inst.C.E., a B.Sc., or even an M.Sc. could not gain a man the Institution's Diploma unless he passed the necessary conditions—namely, an original thesis, and a *viva voce* examination. Mr. Bridge spoke at considerable length on the many details in connection with the Education Scheme; and his remarks were received with great interest and appreciation by the meeting.

Mr. P. M'NAB (Low Moor) thought the "one subject" man should be catered-for in classes.

Mr. F. FIRTH (Leeds) agreed with the latter view, and said that in Leeds the fees for one subject were higher than for the full course. There were many men who could not or would not attend classes three nights per week. It could hardly be expected from a man in his thirties; and if there was no provision for the "one subject" man attending a class one night a week, it would be detrimental to the interests alike of the men and of the undertakings.

Mr. ROPER said the Education Scheme did not apply to many members of the Junior Associations. They had members who thought they were too old to recommence examinations. For the junior entering the gas profession at the present time, the Education Scheme would follow on his school days, and there would be no gap between his leaving school and commencing study on this organized course.

Mr. FIRTH spoke on the question of membership of the Yorkshire Junior Association, and said they should place no difficulty in the way of those who wished to join.

Mr. M'NAB said that if the Council were convinced that an applicant for membership was occupying a responsible position, they would immediately accept him as a member.

Mr. F. A. C. PYKETT (Halifax), Hon. Secretary of the Association, then read the following paper:

REPORTED ESCAPES.

This is a hackneyed subject; yet how many of us regard with comparative complacency unaccounted-for gas equal to 5 p.ct. of the whole of the gas manufactured?

It might be profitable to re-open the question: Why should the unaccounted-for gas be 5 p.ct.—or any other proportion—of the make? To this, the following answers may be given:

1. Shrinkage in bulk.
2. Non-registration of consumers' meters.
3. Escapes that cause loss of gas.

The last item may be divided into two classes:

1. Loss before an escape is suspected.
2. Loss between the date of the report of an escape and the location and repair of the defect.

I agree with a statement made some years ago that in a well-managed gas undertaking there is no such thing as constant leakage at any point. There may be one leak per week in every 100 miles of main, and sometimes less than that; but if this leak is not discovered for a week, there will be two. You will agree with me when I say that this complaint is the most serious and most dangerous of all received in the distribution department of any gas undertaking, and should receive immediate attention. Every report, however trivial, should be inspected the same day as received.

CLASSIFICATION OF ESCAPES.

Reports of escapes can be classified into three categories: (1) Ordinary; (2) urgent; and (3) dangerous. By "ordinary," I mean the kind which is reported by the business man on his way from home—perhaps he has meant to call and report this for the past week. It is "the stove that smells," or "when the room is closed for some time there is a smell of gas." You ask how long

this has been noticed, and are informed that it has been noticeable for the past week or so. "There is no need to send to-day, as no one is at home," is a customary remark.

By "urgent," I mean the type reported (say) by telephone as a "bad escape in the house." The person will say that it is very bad, and should receive attention at once.

By "dangerous" is meant any escape previous to the meter, where the consumer has no control, and cannot stop it. These are either at the main or service outside the building.

A few pertinent questions will soon elicit the necessary information to enable you to decide to which of the above categories an escape belongs. If in the first two, instructions should be given to the consumer immediately to shut-off the gas at the meter, and thus prevent the escape and eliminate the danger. At the same time the consumer should be told not to take any naked light near to the suspected trouble. If the consumer says that the gas has been shut-off, but the smell continues, he should be told to open the windows, doors, &c., to ventilate the rooms and cellars, and to expose no lights anywhere in the house.

In the first two instances the ordinary complaints inspector can remedy the trouble; but in the third case everything depends on some form of predetermined system, with speed as the object in view. First, an efficient telephone system is essential; the report should go straight through to the department concerned, and not be received by any other. After business hours, an intelligent person should be detailed to answer the telephone, and take messages or instructions. Secondly, a list of the names, addresses, and occupations of all workmen and members of the staff in the department concerned should be in the hands of every employee and official. This is of great benefit to workmen requiring assistance, as they can call upon others near at hand. Thirdly, an emergency tool chest or cart should be kept outside the workshops, containing one, two, or three complete sets of tools for tracing escapes. This will enable workmen to obtain a set of tools without wasting time seeking keys for workshops, &c. A complete set comprises: Striking hammer, bar, pick, shovel, trowel, smelling-pipe, tallow, calico, string, and electric hand-lamp. It is one man's first duty each morning to examine this chest, and see that all is correct. If not, he must make inquiries of the other men as to where the materials are, and how long the electric lamp has been in use. Fourthly—transport. This is a very important point. The quicker the men can be transported to the job, the better. In a large undertaking there are usually several motor vehicles in commission, and one of these can generally be requisitioned, if necessary. After business hours, some predetermined system of motor hire should be arranged, to enable the men to be found and transported to the job, if a night shift is not kept.

Preliminary Survey.

Upon arrival at the job, the fitter should first see the person who has reported the escape, and ask to go to that portion of the house where the smell is most noticeable. Inquiry should be made as to whether the smell is noticeable in other houses. He should ventilate the house, forbid naked lights, and put out fires, if deemed necessary. In making a preliminary survey outside the house, the boxes of gas and water valves, stop cocks, hydrants, &c., will sometimes give a good idea as to where to start operations.

The method of pricking-down over the main, and inserting a tube or pipe, with a view to tracing by the smell where to commence excavating operations, is the only sure method. It is usual to prick every three or four feet along the line of the main approximately opposite the houses where there is the smell of gas. In forming an opinion of where to commence excavation, the judgment has to be acquired; but, when so acquired by the men, it is far more reliable than any instrument with which I am acquainted. I am of the opinion that instruments are too sensitive. When placed over a hole in the ground, where leakage is suspected, the indicator travels straight to "all gas," because the ground is usually fairly saturated. If, after excavation, the source of leakage is not located, it is necessary completely to bare the main, to find which way the gas is travelling. It is impossible to form a correct opinion otherwise. A further examination by means of pricking along the end of the opening suspected will usually give a correct idea as to the source of the leakage. When the escape is located, it is a simple matter to make a permanent or temporary repair.

It is essential to the safety of life and property that, during operations, no sparks or lights of any kind be allowed in the vicinity. Oil or tallow should be used plentifully when breaking-up concrete and macadam road surfaces. Pedestrians should be warned against smoking, or dropping lighted matches. Tram drivers should be warned to drive carefully past the danger zone, for fear of causing sparks; and electric hand lamps should be used by the workmen in every instance.

Misleading Troubles.

These are sometimes plentiful; and however experienced the workmen may be, they can be misled. The odour of petrol vapour in small quantities is very much like coal gas. A good idea can be formed if the smell is found to be coming from modern drains or sewers. It is very rare that coal gas percolates the modern drainage system, which is usually laid at a lower level than the gas main. In almost every case the source of the trouble may be traced to a garage situated close by. If the smell is passing along electric conduits, fusion may be the cause of the trouble. The source should be looked for at some point where the main crosses, or is near, the conduit. If the quantity of gas passing through the conduit into property is dangerous, the ground should be throw open, and the conduit broken, in order to obtain an idea as to which way the gas is travelling. Escaping gas can travel up conduits when fusion is not the cause of the trouble; but in this case the quantity is generally limited, as the gas has to percolate leaky conduits, blind boxes, &c., to enter property. Lagging or road foundation can be the cause of much misleading. Under the surface of the road are hundreds of small and large pockets which become charged with gas; and through this cause there appears to be very little difference in the quantity of gas at the various inspection holes which may be pricked.

Causes of Trouble.

Corrosion is chiefly found in services which are of wrought-iron. Fracture occurs with cast-iron mains, and is generally caused by frost, or by sudden change of temperature. In the majority of cases the fracture is at a point where a service connection has been made, or where a support has been placed under the main. The main should be laid on an even bed; excavation only being made to the necessary depth to which the main has to be lowered. Service connections weaken the main to a certain extent. Drawn joints are caused by subsidence. Re-caulking is only a temporary measure of improvement, unless the settlement is complete. If it is not complete, and subsidence is still taking place, steel main with welded jointing is the only perfect cure. Heavy traffic of the present day has a detrimental effect on gas-mains. It can and does cause fractures to take place, especially if excavations to a greater depth than that of the main have been carried out near by. This will cause a weak foundation; and any heavy traffic passing over this point will transmit the weight and shock straight through the soft earth to the rigid main. This paper would not be complete without a few words upon electrolysis. Usually, the source of the escape can be easily traced, as it is generally at a point where the main is nearest the tramway metals. The origin of the trouble is a different matter altogether, and it may be practically impossible to trace it. The only thing to do is to make a systematic test of the transmission of current between the mains and metals every time any excavation is taking place on the tramway route, and note which way the current is flowing, and whether the leakage is above the Board of Trade limits. If there is leakage through electrolysis at certain points of the main, I would not recommend insulation as a preventive, because the trouble would simply be moved to another source. Connecting the main to the metals has been suggested as a means of eliminating metal deposit; but the experiment has not proved successful, and has since been condemned. Modern road construction will, to my mind, be beneficial to the preservation of the gas-main. Though far more difficult to excavate, the present concrete foundation, whether reinforced or not, will to a great extent eliminate road shock being transmitted to the main. It will also preserve the main from sudden changes of temperature. Of course, it is distinctly understood that the main is laid well beneath the concrete foundation, and not merely partly submerged.

I am still looking for an easy and quick method of determining whether a "smell" is coal gas or not. People often report an escape of gas when the smell is not due to gas; and it is very difficult to convince them of this. Palladium chloride papers turn colour in the presence of coal gas.

Discussion.

The PRESIDENT said that many points of supreme interest had been raised in the paper. The question of unaccounted-for gas demanded constant thought and attention. Electrolysis was a growing evil; and this subject should be studied more extensively.

Mr. FIRTH, speaking of instruments used for detecting leakage, said it was always advisable to know the principle of an instrument before using it. It was at times difficult to tell whether a reported escape was really coal gas. He mentioned several cases in which there had been strong "smells of coal gas" reported, but which on examination could not be found.

Mr. ROPER, referring to unaccounted-for gas, said there was no record of that lost when mains and services were being altered by workmen.

A MEMBER, speaking on the question of electric handlamps, remarked that he had many times noticed a spark made by the contact when the lamp was switched on. Such a spark in a place where there was an accumulation of gas was liable to be very dangerous, and therefore the speaker considered that a lamp of this type was certainly not one to use in such circumstances. There was a miner's electric lamp which he thought would be absolutely safe.

Mr. M'NAB said that electric lamps should be switched on before entering a building where there was a suspected escape of gas.

Votes of Thanks.

On the motion of Mr. M'NAB, seconded by Mr. E. GILLETT (Bradford), a vote of thanks was accorded the contributors of the two papers; and Mr. ROPER briefly responded for Mr. Pykett and himself.

Mr. BOYES proposed, and Mr. SMALLEY (Castleford) seconded, a vote of thanks to Mr. Charles Wood for the use of the meeting room.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Service-Pipes and Tenant's Capital.

SIR,—The Cowdenbeath Gas Company's rating appeal, reported in the "JOURNAL" for Feb. 13, raised one novel point which should be of interest to statutory gas companies in England, and appears to be deserving of further discussion.

The Company maintained that a capital expenditure of £6330 on services should be allowed as tenant's capital. The contention was not allowed; and in his judgment Lord Hunter said: "It appears that the piping so laid is heritable, and as such its annual value ought to enter the valuation roll."

Hitherto I am not aware that any serious effort has been made on behalf of English gas companies to include the outlay on service pipes in tenant's capital. Is the point worth putting to the test? In support of the claim one might take the case of a long length of main to supply a particular district. For a while, a certain portion of the main is "dead"; but, after a time, the gap is gradually filled by the erection of houses to which service pipes for gas supply are laid. Does it appear a feasible and practicable arrangement that, with a hypothetical tenant and a hypothetical landlord, the latter should be continually called upon to subscribe more capital for the undertaking? The case postulated above is for the majority of gas companies a regular occurrence; and "rent" under these constantly-changing conditions would be anything but a constant factor.

A recent experience has lent added interest and fresh point to the question. Within the last week I have been discussing with a district valuer the assessments, for rating purposes, of gas and electricity undertakings. In a tentative way the valuer advanced the view that electric services should be regarded as tenant's capital!

SECRETARY AND ACCOUNTANT.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 20.]

Nos. 3452 to 4092.

BAKHUIZEN, W.—"Gas-burner." No. 3596.
BICHOWSKY, F. VON.—"Method for production of cyanogen compounds." No. 3766.
CUMMINS, F. B.—"Coke-extractors." No. 3701.
CUTT, C.—"Suspension means for adjustable gas-fittings." No. 3602.
HARTHAN, J.—See Bichowsky, F. von. No. 3766.
HEENAN, J. N. D.—"Separation of solid matter from gases." No. 3868.
HELPS, G.—"Gas-fires, gas-burners, &c." No. 3827.
HELPS, G.—"Gas-ovens." No. 4034.
JOHNSTON, W. A.—"Back-pressure or reducing valve." No. 3486.
LEEK, A. E.—See Heenan, J. N. D. No. 3868.
M'LEOD, J. W.—"Cylindrical rotating retort." No. 3589.
STEWART, R. F.—"Purification of cresylic acid." Nos. 3702, 3703.
TWIGG, C. H.—See Cutt, C. No. 3602.
WALMSLEY, W. A.—See Stewart, R. F. Nos. 3702, 3703.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Petitions Deposited against Private Bills.

Petitions have been deposited by the Altrincham Gas Company against the Manchester Corporation Bill; by the Gas Light and Coke Company, and the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company against the North Metropolitan Electric Power Supply Company Bill; by the Grays and Tilbury Gas Company against the West Thurrock Wharf and Railways Bill; by the Hastings and St. Leonards Gas Company against the Hastings Corporation Bill; by the Bedwas and Machen, Caerphilly, Rhymney, Mynyddislwyn, Bedwelty, and Gelligaer Urban District Council, and the Great Western Railway Company, against the Rhymney and Aber Gas Bill; by the Gas Light and Coke Company against the London County Council (Lambeth Bridge) Bill.

Tarred Roads and Fisheries.

Lord DESBOROUGH, on Tuesday of last week, moved for a return containing a general report of the laboratory experiments and field experiments carried out from 1919 to 1921 by the Joint Committee of the Ministry of Transport and the Ministry of Agriculture and Fisheries as to the effect of washings from tarred roads on fisheries. He said that many people ascribed the death of fish throughout the country to the tarring of roads. He urged the publication at the earliest possible moment of the valuable report that was in being dealing with the prevention of river pollution.

Lord GAINFORD remarked that he had had some experience of the matter, and he realized that pollution was due to four causes, included among which were sewage and local chemical works on the banks of rivers. The vital one was the tarring of roads at spots where rain water washed from the roads into the rivers. It had been proved that the use of bitumen instead of tar, though it was more expensive, would solve the difficulty, because no deleterious matter came from it.

Lord PARMOOR said the Government hoped to publish the report. The matter was not a new one, and research had been largely undertaken. The report strongly condemned the use of tar in making roads at points where water would wash from the road surface into the streams; and the Committee considered that the highway authorities should give preference to bituminous asphalte. The desire of the Government was that the report should be printed and circulated as soon as possible.

HOUSE OF COMMONS.

Progress of Bills.

Rotherham Corporation Bill: Read a second time, and committed.

Gas Regulation Act.

Copies were presented of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Act on the application of the Brentford Gas Company and the Accrington Gas and Water Board.

Sulphate of Ammonia Supplies.

Mr. F. MARTIN, on Monday of last week, asked the Minister of Agriculture whether he was aware that during the spring months of last year home farmers had difficulty in obtaining supplies of sulphate of ammonia, and that large quantities of this fertilizer were exported from this country; and whether he would take steps to ensure that a sufficient amount of the material was retained in this country and was made available to British agriculturists during seed time this year?

Mr. BUXTON in reply said that he was aware that in some districts the supply of sulphate of ammonia for immediate delivery in the spring of last year was not large He was advised that the supplies available this year would be sufficient. The matter would be kept under observation.

Exports of Coal-Tar Products.

Mr. A. V. ALEXANDER (Parliamentary Secretary to the Board of Trade), in a written reply to Mr. WADDINGTON, stated that the quantity of dyestuffs, products of coal tar, of United Kingdom manufacture, exported during the year 1913, was 60,733 cwt., of a total declared value of £206,109, or an average of £3 7s. 10d. per cwt. The exports in 1923 amounted to 126,187 cwt., valued at £1,031,903, or an average of £8 3s. 7d. per cwt.

LEGAL INTELLIGENCE.

Salcombe Gas and Coke Company, Ltd.

On Tuesday, the 19th inst., Mr. Justice Russell heard a petition asking the Court to confirm resolutions which had been passed to extend the objects of the Company. Mr. Whinney said the Company was founded in 1865, with a model memorandum, to supply Salcombe, in the county of Devon, with gas. The capital was only £2600, which had been fully paid up; and the business had been most successful. It was now proposed to carry on an electrical branch, and to deal in all apparatus used for the distribution and supply of electricity. It was further proposed to take power to borrow, and lend, money, to carry on the Company's business satisfactorily. No debentures had been issued, and the Master had found that the necessary resolutions had been duly passed and the consent of the creditors obtained. His Lordship sanctioned the alteration.

Responsibility for Prepayment Meter Contents.

The question as to whether money deposited in a prepayment gas-meter belongs to a gas company before it is collected each quarter was raised at the Leamington Police Court last week, in a case in which an errand boy named Alexander Boswell was charged with stealing £1 12s. from a meter. The Chief Constable said he had expected the Gas Company to take up the prosecution; but they had repudiated all connection with the matter, saying that the money did not belong to them. He was therefore the prosecutor. Alderman W. Davis (one of the Magistrates) thought, as the money would be deposited in the meter for the Gas Company, it was their property. The Clerk pointed out, however, that a case had been decided which supported the attitude of the Company. The money was the property of the occupier until it was collected by the Company. The youth was bound over for twelve months.

Aberystwith Gas Company.—The report of the Directors states that the accounts for the half-year ended Dec. 31 reveal the very satisfactory condition of the undertaking. There has been an increased sale of gas of more than 7 p ct., the receipts from residuals have been fairly good, the plant has been well maintained, and the profit is such as to justify the venturous reduction in the price of gas, which dates from Dec. 31—a reduction from 1s. to 10d. per therm—equivalent to 9d. per 1000 c.ft., and amounting to about £2800 per annum, or 5s. per head of the population of the town. The balance of profit is £2576, out of which it is proposed to pay dividends of 5 p.ct. per annum on the original shares, 10½ p.ct. on the new shares, 15 p.ct. on the preference shares, and 4½ p.ct. on the debentures, all less income-tax. This will leave £1224 to carry forward. The Directors state, with sincere regret, that their esteemed Secretary (Mr. W. J. Fearnsides) is retiring from the position. Reference was made to this matter on p. 425 of the "JOURNAL" for Feb. 20.

COMMERCIAL GAS COMPANY.

The Annual Ordinary Meeting was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW, C.B.E., in the chair.

The SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

A NEW DIRECTOR.

The CHAIRMAN, on rising, said: Gentlemen,—You will perhaps recollect that at our meeting last year I had the sad duty of announcing that our esteemed friend and colleague Mr. R. Y. Bevan had passed away the previous day. After careful consideration, we have appointed in his place the Honourable Kenneth Mackay, the only surviving son of Lord Inchcape, the Chairman of the Peninsular and Oriental Steamship Company and other important concerns. I regret that he is not able to be with us to-day, by his doctor's orders; but perhaps I can speak of him more freely in his absence. He is, comparatively speaking, a young man; but I am sure you will agree that it is well for every company to have some younger men about it who will gradually acquire knowledge and experience of its circumstances and needs, and will bring to it the freshness and energy of youth. Mr. Mackay has had very unusual opportunities of acquiring business experience in many important directions, and I can confidently introduce him to you as a promising son of a very distinguished father, whose footsteps he is closely following. His appointment will come up for confirmation by the shareholders at a later stage in our proceedings, when I can give you any further information which you may desire.

SATISFACTORY REPORT AND ACCOUNTS.

It is gratifying to your Directors that the report and accounts which I have the honour to submit for your approval to-day may undoubtedly be regarded as satisfactory. The year 1923, which they cover, was not characterized by any notable incidents or changes, if the political situation, with which we have not to deal at this meeting, is excepted. In the early months there was a slight improvement in trade, which, however, speedily died away, and was followed by complete stagnation in nearly every industry; but in the last few months there were unmistakable signs that a gradual revival in the commerce and manufactures of the country was taking place, and happily they have continued to the present day. If the improvement is not interfered with by social or political disturbances, and if a wise monetary policy is pursued, we may hope with some confidence that the dawn of better things is at hand, and that the unemployment, which is such a distressing feature of the present time, will gradually but surely pass away. Our accounts reflect accurately what I have pointed out as taking place around us. The district which we supply, being almost exclusively industrial and working class, is exceptionally sensitive to any change in the trade and business of the Metropolis. For the whole year we had an increase in our sale of gas of 3¼ p.ct., which was very satisfactory, and especially so if we realize that the Company is completely surrounded by other gas companies, and that it has no virgin soil to exploit. It is an encouraging circumstance that the greater part of this increase took place in the second half of the year. For the first quarter our sales were less than those of the corresponding quarter of the previous year by nearly ¾ p.ct.; in the second quarter, there was an increase of 7 p.ct.; in the third quarter, of rather less than 1 p.ct.; and in the last quarter, an increase of nearly 7 p.ct. This improvement is being maintained during the current quarter. The output to date shows no falling off in the rate of increase of the last quarter of 1923.

CONSUMPTION AND PRICE.

The number of consumers is now 117,059, which is 643 more than in December, 1922. During the year we fixed 3979 additional stoves, which is the highest number fitted in any year since 1916. Another feature of the year's trading, which is instructive, pointing as it does to an increase in the purchasing power of the residents in the district, is that the average consumption per prepayment meter, which had been dropping since 1920, when it reached its highest point of 19,574 c.ft., now slightly exceeds this figure. The price charged for gas was reduced at the commencement of the year from 10d. per therm, or 3s. 11½d. per 1000 c.ft., to 9·6d. per therm, or 3s. 9½d. per 1000 c.ft., at which figure it stood during the whole year. We have now further reduced it, as from the beginning of the current year, to 8·8d. per therm, which is equivalent to 3s. 5·8d. per 1000 c.ft. The price is now about 49 p.ct. above the pre-war price. As the cost of keeping a working man's household is, according to the published figures of the Board of Trade, 79 p.ct. above the pre-war cost, the Gas Company is certainly supplying its customers with a cheap article. I ought to mention that, in reducing the price of gas to 8·8d. per therm, we are taking a risk of not being able to earn as large a profit in 1924 as we did the previous year. I have no doubt, however, of the wisdom of trying to fan the glowing embers of reviving trade, and of doing all in our power to assist the manufacturers and other consumers in our district.

A NEW SHOWROOM.

In recent years the need and the benefit of drawing the attention of the public to the numerous uses to which gas can be advantageously put has been increasingly apparent to gas administrators, and successful efforts have been made from time to time to advertise the fact that gas is for the home and for many industries the most economical and reliable of all fuels. During the past year a National Gas Exhibition has been held at Birmingham, and exhibits of gas appliances have been made at the Ideal Homes Exhibition, the Shipping and Engineering Exhibition, and the Food and Cookery Exhibition. This year the industry is arranging for a joint gas exhibit at the British Empire Exhibition at Wembley, in which we, with other companies, are taking a part. Hitherto we have not possessed a showroom apart from the chief office at Stepney. We have now, however, purchased some excellent premises in the East India Dock Road, where it is proposed to provide permanent exhibits of those appliances most suitable for our district. We anticipate that this additional showroom will greatly increase the sale of these appliances, and so augment the consumption of gas. Advantage will also be taken of the premises as a distribution depôt; and we expect that a large economy, sufficient to defray the whole, or at any rate a considerable portion, of the cost of the showroom, will be effected, and the requirements of consumers in that part of our district will be more promptly dealt with.

THE STANDARD PRICE.

The report mentions that the Company has received notice that an application has been made to the Board of Trade by the London County Council for an Amending Order reducing the standard price prescribed by the Commercial Gas Company (Charges) Order made in 1921. The application is to be heard next month. The Gas Regulation Act, under which the existing Order was made and the new application is put forward, was passed mainly to remedy the hardships imposed on gas shareholders by the temporary failure of the old sliding-scale to meet the higher costs of manufacture brought about by the war. This Company's Order was made in April, 1921; but owing to the disastrous miners' strike of that year little advantage accrued to the shareholders until they received the dividend in August, 1922, and they have had no compensation whatever for the miserably inadequate dividends the Company were permitted to distribute during the war. It cannot but be admitted that the Company has made a moderate use of the powers conferred upon it by the Order. At the present time we are recommending the payment of dividends at the rate of 6 p.ct., whereas the rate of dividend authorized by the Company's Order is £7 17s. 4d. p.ct. on the 4 p.ct. stock and £8 6s. 8d. on the 3½ p.ct. stock. We do not contest that some reduction in the standard price is justified by the fall in the cost of manufacture and distribution, but we contend that, whatever reduction is made, it should only be in respect of those items of expenditure over which the Company has no control; otherwise all incentive to economy of working and good management would be removed. We are sure to receive equitable treatment at the hands of the Board of Trade; but their powers under the Act are restricted, and there is no appeal except by the cumbersome method of promoting a Private Act of Parliament. Any reduction of the standard price which would render it impossible for gas companies to pay such a dividend as would cause their stock to stand at or over par in the market, would increase the cost of raising capital, and ultimately ensure to the disadvantage of the consumer. An experience of many years leads me to say that the attempts of local authorities to harass public utility companies (often made merely for electioneering purposes) almost inevitably result in loss to the consumers whose interests the local authority is supposed to protect. Tranquillity and freedom from outside interference are required for the success of all industrial undertakings, and gas companies are no exception to the rule. Moreover, under the working of the sliding-scale, what is good or bad for the shareholders is also good or bad for the consumers, for their interests are identical.

THE THERM INQUIRY.

The report of the Board of Trade Departmental Committee, which I mentioned at our last annual meeting as having been appointed to consider the question whether gas should be charged for by the therm or by the 1000 c.ft.—*i.e.*, by the quantity of heat supplied or by the volume of gas—was a complete vindication of the therm method of computation. At the suggestion of the Committee, it has become the practice to state on accounts for gas delivered to consumers, not only the number of therms consumed, but their equivalent in cubic feet. The decision of the Committee has received practically the universal approval of the gas industry, and as the system is becoming better understood criticism on the part of the public and the Press is dying away. As a result of the adoption of the therm system, it is now for the first time possible to make an accurate comparison of the working results of gas undertakings; and this is of itself a great advantage to gas administrators.

THE ACCOUNTS.

Let us now turn to the year's accounts. Although we sold 604,441 therms more than in 1922, the total cost of manufacture and distribution was actually £11,778 less. The receipts from gas sold were less by £92,035, owing to the reduced price; but residual products yielded more by £63,204, and rentals of meters and stoves gave an additional £4925. So that the balance of profit carried to the net revenue account, which amounted to £161,925, was only less by £12,074. Adding the balance brought forward from the previous year of £55,503, and deducting the interest on the debenture stock and temporary loans, amounting together to £19,866, we have a sum of £197,562 left. The dividend paid in July, at the rate of 6 p.ct. on both classes of stock, cost £62,198. The payment of a dividend at the same rates which we recommend to you to-day will absorb a similar amount, and will leave a balance of £73,166 to be carried forward to the current year. This is £17,662 more than was brought forward from the previous year.

LOOKING FORWARD.

I have little to add to what I have already said. The year 1923 was not an eventful one so far as the Company was concerned, but it brought with it a welcome increase of business and a steady improvement in many ways. We have purchased somewhat earlier than usual the coals required for the current year, at a small reduction on last year's prices; and it was well that we seized the opportunity of an easier market, for prices have hardened since. The price of coke appears at present likely to be maintained; but the receipts from tar and sulphate will probably be less, and gas sold will not produce so much, owing to the lower price, unless we have a very much larger sale than is probable. But we may look forward, I think, to having, with some assistance from the sum carried forward, sufficient to provide a satisfactory dividend. Our relationship with our employees continues to be all that can be desired. The workmen, in accordance with an arrangement made by the gas industry with the men's representatives, have received an advance in their wages of about 2s. 3d. a week as from Jan. 1, and I believe that they are quite satisfied with the terms

of their employment. Under the profit-sharing scheme they have a large holding in the Company's stock, and the pension scheme and the benefit society give them a further interest in its success. The employees now have an interest amounting to just about £120,000 which they would not have had but for the profit-sharing scheme. What the future has in store for us, no man can say; but the Company is sound, and its works are well equipped and up-to-date. You are served by an able and devoted staff, admirably led and inspired by Mr. Stanley Jones and Mr. Bradfield. The men are satisfied that their welfare is a matter of concern to those who manage the Company, and I am confident that they are loyal and true. The consumers are getting their gas at a moderate price, which compares exceedingly favourably with the cost of almost every other commodity that they purchase. Thus, if no trouble comes upon us from outside, the future prosperity of the Company is well assured. I beg to move—

"That the report and accounts be received, adopted, and entered on the minutes."

The DEPUTY-CHAIRMAN (Mr. H. E. Jones) said that he had very great pleasure in seconding the resolution, and he would like to supplement the Chairman's admirable description of the Company's position in relation to the staff by letting them know how much they owed in this connection to the Chairman himself. It was largely the practice to-day to put in the chair of companies men who had been a long time in the office, and therefore knew the routine, but their Chairman needed no such preparation. He gave at all times, with his very bright intelligence and great financial knowledge, the most careful attention to the details of the administration of the Company; and the relations with the workmen, which he spoke of as being so favourable, were largely due to the way in which he encouraged his chief officers to give similar encouragement to those below them, and identified himself always with any movement that could improve the position of the working classes in the employ of the Company. It was to him (the speaker) a matter of great pride to see that the second Company with which he ever had anything to do had reached the position of the Commercial Gas Company. Of course, it was a small undertaking compared with the two other Companies with which it was put in a special class by the London County Council and the Board of Trade. One of these other Companies was ten times as large as theirs, and the other four times. Their works were all on a magnificent scale, and all three works of the Commercial Company (which they could not abandon because the smallest was in the most favourable position for getting coal on the Thames) would not quite make up one of an equal size of the works the other two Companies possessed. They knew that, to divide the staff up, with extra foremen, for a smaller output, handicapped one, but to-day the Commercial Company was paying a rather better dividend, and the capital compared favourably with that of the other two large Companies. The Commercial Company had a district inhabited mainly by the working classes; there were no luxurious shops, theatres, restaurants, hotels, &c. Yet they kept their flag flying, and this was because the Chairman followed the plan of superintending everything. As a lay Chairman, not having been technically connected with the industry, Mr. Bradshaw stood unrivalled to-day. Though, of course, he could not say much about this, they possessed in their Chief Officer a man who kept up the flag which his grandfather raised in 1853 when he came to London to take charge of the Company's interests. Added to this, they had in their Secretary a statistician of the ablest and most discriminating character, and the promptest. He gave them at the very earliest time comparisons of the smallest items of the working of the Company and others round about, and these statistical warnings greatly assisted in keeping the Company where it stood to-day. It was with the greatest satisfaction that he seconded the adoption of the report and accounts, and declared—as, he supposed, the oldest shareholder present, and certainly the oldest gas administrator in London—how proud he was of this little Company.

Mr. A. W. RAKE thanked the Chairman for his very lucid speech. As to the action of the London County Council, he took it the Company would take steps to have its views placed properly before the Tribunal that was to adjudicate. He gathered that the Company had not been at all hit by the dock strike.

The CHAIRMAN replied that they had already prepared themselves to meet the inquiry in the fullest possible manner. The dock strike had not affected them, as their coal nearly all came straight into the works.

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. H. E. JONES, the following motion was next agreed to:

"That, pursuant to the recommendation of the Board of Directors, a dividend be declared for the half-year ended Dec. 31, 1923, at the rate of 6 p.ct. per annum, less income-tax, on both the 4 p.ct. stock and the 3½ p.ct. stock of the Company, payable on Feb. 22; and that warrants for the same be forwarded by post to the proprietors."

RE-ELECTIONS AND THANKS.

The CHAIRMAN then proposed the re-election of the retiring Directors, Mr. H. E. Jones, Sir Frederick Green, K.B.E., and the Hon. Kenneth Mackay. Mr. Jones was a Past-President of the Institution of Gas Engineers and also of the Institution of Civil Engineers—the highest honour which an engineer in this or any other country could possibly attain. Sir Frederick Green's name was a household word in connection with everything which was sound, and good, and prosperous. He had already mentioned Mr. Mackay, whose election to the Board would be an advantage to the Company.

Mr. H. W. GELL, O.B.E., seconded the proposition, which was carried unanimously.

The retiring Auditor (Mr. B. W. Ellis) was re-appointed, on the proposition of Mr. G. M. GILL, seconded by Mr. GROVES.

On the motion of Mr. F. JONES, seconded by Mr. R. S. YOUNGS, the Chairman and Directors were heartily thanked for their services during the past year.

The CHAIRMAN acknowledged the compliment, and proposed a similar vote to the officers, staff, and workmen of the Company. They owed, he said, everything to the staff and workmen who served them so well. But the Directors could not possibly have given so good an account of Mr. Stanley Jones's work (and the work of others), had it not been for the fact that his father and grandfather had laid the foundations of the Company in so sure and so strong a manner. They had a body of able and faithful servants; and whatever might lie before them, no effort would be spared on the part of those who did the work of the Company. He said this with every confidence, because they had worked so well and strenuously in the past.

Mr. STANLEY H. JONES (the Engineer and General Manager), on behalf of the staff and workmen, said he was deeply grateful for the vote. The Chairman had referred to the loyalty and good work of the staff and employees. Happy was the nation that had no history. They in the gas industry had, in these troublous times, been singularly free from strikes and unrest, and this was largely due to the excellent relations between the representatives of the gas industry throughout the country and the trade union representatives of the workmen. He attended meetings once every few months for the Company, at which Mr. Milne Watson was in the chair, and they met Labour Members of Parliament and representatives from all over the country. There were some 900 undertakings represented—municipal as well as company—and it would please the shareholders to see the happy state of affairs that prevailed at these meetings. So long as this tactful treatment of labour in the gas industry continued, there was no need to worry; and a great deal of the success achieved was due to the personal handling of affairs by Mr. Milne Watson. With regard to the work of the Company's staff and men, he (Mr. Jones) could bear testimony to the excellent service they rendered, and to their loyalty. The staff included some young engineers who were, in his opinion, unequalled in the gas industry.

Mr. BRADFIELD also acknowledged the vote on behalf of the clerical staff.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

SPECIAL ORDERS.

King's Lynn Gas Company.

The Company intend to apply for an Order under section 10 to authorize the conversion of the capital, the fixing of a standard price, the raising of further capital, and the extensions of the limits of supply, &c.

Pioneer Gas Company, Ltd.

Application is to be made by the Company for a Special Order to enable them to purchase further gas lands, to raise additional capital, to establish profit sharing, and to regulate the supply of gas.

Poulton-le-Fylde Urban District Council.

Notice is given by the Council of their intention to apply to the Board of Trade for an Order under section 10 empowering them to extend the gas supply limits, to make provision as to the price to be charged for gas, to use scheduled land for gas-works purposes, to borrow money, and to regulate the supply of gas.

DECLARATIONS OF CALORIFIC VALUE.

Ashburton Urban District Council.—475 B.Th.U. (March 1.)

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Dunfermline Corporation.

The Order is in general terms, without the naming of any price. (Feb. 14.)

Edinburgh Corporation.

After the declared date, "1·2d. per therm" shall be substituted for "6d. per 1000 c.ft." in sub-section (1) of section 11 (differential charges) of the Edinburgh and Leith Corporation Gas Order, 1902. (Feb. 15.)

Festiniog Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19·2d. per therm.

After the declared date, the price of 15 6d. per therm shall be substituted for the price of 4s. per 1000 c.ft. mentioned in Article XXVI. of the Festiniog Gas Order, 1883.

After the declared date, the price of 19·2d. per therm shall be substituted for the price of 5s. 6d. per 1000 c.ft. mentioned in Article XXVIII. of the Festiniog Gas Order, 1883. (Feb. 16.)

Southport Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 12d. per therm, and this price shall be substituted for the price of 4s. per 1000 c.ft. mentioned in section 30 (limiting price of gas) of the Southport Improvement Act, 1871.

After the declared date, "1d. per therm" shall be substituted for "6d. per 1000 c.ft." in the proviso (price of gas to consumers outside borough) to paragraph (2) of Article I. of the Southport Order, 1902. (Feb. 21.)

West Staffordshire Gas Company, Ltd.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18·8d. per therm, and this price shall be substituted for the price of 5s. 10d. per 1000 c.ft. wherever it is mentioned in section 23 (price of gas) of the West Staffordshire Gas Order, 1913.

After the declared date, the "therm" shall be substituted for "1000 c.ft." in paragraph (2) of Schedule B to the West Staffordshire Gas Order, 1913, and "fifth of a penny" shall be substituted for "penny" wherever it occurs in that paragraph. (Feb. 19.)

BRENTFORD GAS COMPANY.

The Annual General Meeting was held last Wednesday at Caxton Hall, Westminster—Mr. R. J. NEVILLE NEVILLE presiding.

The SECRETARY (Mr. H. L. Mann) having read the notice convening the meeting, and the resolutions of the last ordinary meeting and extraordinary meeting, the report of the Directors and statement of accounts were taken as read.

The CHAIRMAN: It now becomes my duty to propose that the report and accounts, which have been in your hands now for some days, should be approved and adopted, and, in doing so, I think that I may congratulate the shareholders upon the results of the past year's working. When you consider the great difficulties we have had during the last year, the many uncertainties, the instability of business, and other things, you may fairly congratulate yourselves upon the fact that the account is so favourable as it is.

LARGELY INCREASED OUTPUT.

In the first place, the increase in the output has been extremely marked. The quantity of gas sold shows an increase of 8·57 p ct., as compared with the previous year; and when I tell you that in the course of the last thirty years that figure has only been exceeded on four occasions, and that this period of thirty years includes the enormous increase that was due to the making of munitions during the war, you will consider yourselves in a very excellent position to have obtained in the past year such an increase as I have named. It is the fact that we have secured this increase in output which has put a favourable complexion upon almost every item in the accounts. This is a rather important year for the Brentford Gas Company. We think it will be the last year during which the area of the Company will remain the same as it has been for the last eight years. It will be within the recollection of most of the proprietors—certainly of the older ones—that it was in 1915 that we took over the two smaller Companies of Staines and Egham and Sunbury. The Act of Parliament which authorized the amalgamation received, I believe, the Royal Assent about three days before war was declared, so that the eight years I am referring to have constituted a period of great stress for all enterprises—and not least for the gas industry. I hope very shortly we shall receive from the Board of Trade the Order which was mentioned to you at the extraordinary meeting on May 25 last, and if that is approved the area of the Company will be greatly extended. Of course, in taking over at the beginning of 1915 the two undertakings to which I have alluded we have not had at all the experience that we expected when we promoted the scheme, because ever since that year times have been abnormal; but in spite of this, I may tell you that the united undertaking, which includes these two smaller concerns, has certainly derived very great benefit indeed from the amalgamation. Much of the prosperity that we enjoy to-day is due to this amalgamation. The year has been remarkable for another fact, and that is that we have added the largest number of ordinary meter consumers recorded during the past twenty years; and, as you can easily understand, the ordinary consumer, as compared with the slot consumer, is more profitable from the point of view of the Company, because his consumption is considerably greater than that of a slot consumer. It is due largely to the 1700 odd new ordinary consumers that we have had the expansion in the output of gas to which I have drawn your attention.

OUTSIDE LIGHTING.

You will see, if you look at the capital account, that large sums of money have been spent during the year on various objects which have been designed to cope with and promote the expansion of the business. The capital expenditure since Dec. 31, 1922, has been for lands acquired, including buildings, £39,545; new buildings, plant, and machinery, £61 970; new mains, services, &c., £44,505; and new meters and stoves, £74,590. When I tell you that at the present moment we are putting out stoves to the number of 200 a week—that is to say, at the rate of 10,000 per annum—you can understand that, if things remain so, and we have normal times, the increase in business for the year 1924 ought to be very considerable indeed. This means, of course, that our staff have been busy all the year in providing for the extended demand which we have had and which we expect. Besides this, we have recovered to a large extent our advertisement lighting. I do not know whether any of you are familiar with our district, but if you will take a walk down the main streets you will be surprised to see what a large proportion of the outside lighting is in the hands of the Brentford Gas Company. This is due to the extent of our high-pressure main system. Lighting of the kind to which I refer is a very good advertisement for us. Another thing which distinguishes the year under review is that we have achieved a record figure with regard to the revenue. That is to say, 1d. per 1000 c.ft. of gas sold is for the first time over £20,000. To be exact, it is £20,420. On the other basis, 1d. per therm comes to £96,000. Thus it is quite clear that when we secure (as we expect to do) the Harrow and Richmond Companies, 1d. per therm will represent well over £100,000. From information we have received as to the outputs at both the places I have named, I think, as a Company, we shall have every reason to be satisfied when these two undertakings are amalgamated with our own. We have also had a record maximum output for a single day, and that is over 20 million c.ft. The average day's supply is about 14½ millions.

RATIO OF NET PROFIT TO GROSS REVENUE.

Another feature which I am sure will commend itself to all the proprietors is that our ratio of net profit to gross revenue has turned the corner. It is beginning to rise again, and we are getting back gradually into the position of some few years ago. For instance, in 1913, which was the last year before the war, our ratio of net profit to gross revenue was 3s. 4d. in the pound, or 16 8 p.ct.; while in 1916 it went down to 2s. 6d., in 1917 to 1s. 9d., in 1918 to 1s. 4d., in 1919 to 9d., and in 1920 to under 6d. Then came a change. In 1921 the ratio of net profit to gross revenue was up to 1s. 4d. in the pound, in 1922 to 1s. 8d., and in 1923 to 1s. 11d. This shows that we are returning to more normal times. The tendency with regard to expenditure has until quite recently been on the downward grade. That is shown in the accounts, where you will see that the total expenditure appears as £1,205,359, as against £1,291,691 in the previous year, when the output was 8 57 p.ct. less. This is a falling off of 6·68 p.ct. On the other side, the total revenue decrease was about 3 87 p.ct., or £56,000. This decrease is, of course, due to the fact that we reduced the price of gas very considerably during the year. The net result is that the balance which goes to profit and loss account has been increased by £29,703.

THE LABOUR POSITION.

Latterly prices of coal and other things which we require have shown a tendency to rise. What the effect may be on the business of the dock strike, the railway strike, and the other strikes, it is impossible to say now; but there is no doubt that if the upset lasts long prices will be affected. Unfortunately, the dock industry, and some other industries which have been disturbed, do not possess, as the gas industry does, the finest mediator in the country; and luckily for the Brentford Company, that mediator is sitting at this table. The tranquillity which prevails among the workmen throughout the gas industry is very largely due to the tactful way in which Mr. Milne Watson has dealt with the various questions regarding wages which are constantly cropping up. If any person deserves recognition, not only by the gas industry, but by the country at large, that person is Mr. Milne Watson, who has done so much in this way for an industry employing many millions of pounds capital, and many hundreds of thousands of people. We owe our very best thanks to him for having steered the ship of the industry as he has done so successfully through such troubled waters. [Applause.]

FURTHER LAND ACQUIRED.

I do not propose to take you through the accounts in detail. I mentioned just now that, in the capital account, we have spent £39,000 on land and buildings. Included in that land is a piece at Greenford, 30 acres in extent, which is excellently situated for our purposes on the Grand Junction Canal, which passes Southall. It is also close to the railway station, and will afford us facilities for sidings. It is well placed for our district, being at the north end, and if, and when, we are linked up with Harrow, it will give us an opportunity for an extension which we shall greatly need, for on a considerable portion of the land gas may be manufactured. This Greenford site, we think, will be most valuable to us in the future, and it is a purchase which will amply repay the Company.

PRICE, OUTPUT, AND CALORIFIC VALUE.

The price charged for gas at the beginning of 1923 was 11d. per therm. At present it is 9·8d., and it went down in two stages. The average price per therm for the year was about 10¼d., and the relief which the consumers secured by the reductions amounted to about £125,000. That is to say, the reduction in the price of gas over the year has benefited the consumers to this extent. Of course, the figure of 9·8d. per therm—our present price—will involve a rental reduction for the current year to the extent of the difference between 10¼d. and 9·8d. Glancing at the history of our Company, it is seen that the average increase in output during the last fifteen years amounts to about 5½ p.ct., and taking the last eight years the average increase works out at 3 6 p.ct. This includes certain decreases of output which took place when the munition factories were shut down, after the enormous increases we had during the time they were open. We have brought ourselves into line with some of the other companies in London, by raising the calorific value of the gas from 460 to 500 B.Th.U. This has, we think, bestowed a great deal of benefit upon our consumers throughout the district. The difficulty we have had in our area, as I have told you before, is the tremendous way in which people will burn our gas for one particular hour in the day—namely, mid-day Sunday. That is the heaviest hour we have during the whole week; and the heaviest hour throughout the whole year is about the hottest Sunday in July. Then all the people have their coal fires out, and burn gas to cook. Anyhow, the actual output of gas in the Sunday mid-day hour is about 40 p.ct. higher than in any other hour during the week. The result of this has been to put a severe strain upon our supply during that time; and in places where the pressure is difficult to arrange, owing to the configuration of the ground, there has been trouble sometimes in meeting the requirements. But we think the higher calorific value we are now supplying has relieved the situation—at any rate, we have not since received many complaints in regard to pressure.

PREPARING FOR LARGER BUSINESS.

We have also during the year gone in for a large number of extensions, and I wish that all the shareholders would come along and see the works both at Brentford and Southall, because I think the visit would well repay them for their trouble. We have got a splendid new set of purifiers at Southall, and we have also made an extensive addition to our tar plant there. A very large sum has been spent, too, on mains and services. So that an enormous amount of work has been done during the year in preparation for the extension of business which we see in front of us. We are glad to know that building is being resumed in our district. It is getting quite good in Brentford. There are new estates being planned, all of which will take our gas; and not only is such an extension of building operations taking place in our district, but we look over our boundary into Harrow, and see also an enormous extension going on there. I hope, however, we have taken sufficient precautions to meet all likely demands. Our relations with our employees are excellent, and I think I am right in attributing that largely to the influence of Mr. Milne Watson, who has shown considerable statesmanship in the way in which he has handled the wages question. Quite recently we have, without any strike or friction with the men or the union which represents them, reviewed the sliding-scale under which the wages were fixed, and we have increased them by ½d. per hour, dating from Jan. 1 last. If we can only get equally good work from our men in the future as we have had in the past, and with trade and business increase normal, I think we shall be able to bear this extra burden with no great difficulty. In connection with our Order—which the General Election has delayed, but which we hope

will now very shortly be confirmed—we met with a considerable amount of opposition, the inquiry lasting several days; and it cost us, therefore, a good deal of money.

FINANCIAL.

Turning now to the accounts, you will see in the revenue statement that rates and taxes have risen slightly. The interest which we pay at the present time on our loan capital (£45,565) is practically the same as we have to pay in rates and taxes, which seems a pretty heavy proposition. As a matter of fact, rates and taxes amount to £880 a week and the debenture interest to £872 a week on the average. We had two steamships, and unfortunately the other day one of them, when in the North Sea, bringing coals from Newcastle, was cut through by an American boat, and became a wreck. Of course, the ship was insured, and I do not think its loss will make much difference to the accounts. You will see that, as a matter of fact, we have carried on during the past year practically upon an overdraft. The balance at debit of capital account is £202,434, and in the balance-sheet you will see "Westminster Bank overdraft £200,282." This means that the capital account is overdrawn to the extent of £200,000. The shareholders some time ago gave us powers to raise further capital, and it depends upon how long the bank will allow us to continue the overdraft as to when we shall have to exercise this power. The probability is that when we take over Richmond and Harrow we may have to get additional capital, but we shall not raise more than is necessary. The year under review is a very satisfactory one, and I think we may look forward to the future with confidence. I now beg to move—

> "That the Directors' report and statement of accounts, as published, for the year ended Dec. 31, 1923, be received, adopted, and entered on the minutes."

Sir ROBERT SHAFTO ADAIR, Bart., seconded the resolution.

Mr. L. TREWBY inquired whether the increase of 8½ p.ct. in output was in volumes or therms, and also whether the Board had considered the advisability of establishing co-partnership.

The CHAIRMAN replied that the increase was in therms. The Directors had carefully considered the question of co-partnership, but the Company had something which was rather different. They provided pensions for their workmen, and they also gave them an allowance if they broke down. Many men had received this allowance in quite early days. The Board thought their men were well satisfied with present arrangements.

Mr. BERTRAM W. ELLIS congratulated the Board upon the progress of the Company during the past year. There was a large amount in the revenue account for repairs and renewals of stoves. He presumed that these stoves came in in a disgraceful condition, and he suggested that it might be possible to institute small quarterly monetary prizes to be awarded to those consumers who had kept their stoves in the best condition. This thought had occurred to him as the result of reading in the "GAS JOURNAL" about the action of the Macclesfield Corporation in selling gas at ½d. per therm less to consumers who installed improved fittings.

The CHAIRMAN promised that the Board would consider the suggestion, but he did not think it was the dirtiness of the stoves that was the trouble with regard to repairs. Many of the stoves were old, and they had been overhauling them, and now that the calorific value of the gas had been changed it had been necessary to adjust a large proportion of the fittings. Over 50,000 had been inspected recently. If in the course of this work they came across defective stoves, it was, of course, not in the interest of the Company to let them remain, and so they took them to the works to be repaired.

The resolution was then carried unanimously.

THE DIVIDEND.

The CHAIRMAN then moved the following resolution, which was seconded by Sir ROBERT SHAFTO ADAIR, and agreed to—

> "That final dividends for the year ended Dec. 31, 1923, subject to income-tax, be declared—viz., at the rate of 5 p.ct. per annum on the 5 p.ct. preference stock; at the rate of £6 2s. p.ct. per annum on the 'A' consolidated stock; and at the rate of £6 2s. 6d. p.ct. per annum on the 'B' consolidated stock, and that such dividends be payable on March 1 next."

RE-ELECTIONS AND THANKS.

The CHAIRMAN proposed the re-election as Directors of Sir Robert Shafto Adair, Bart., and Dr. Thomas Ethelbert Page. Both gentlemen had considerable knowledge of the Company's business, and were most diligent Directors.

Brigadier-General ALEXANDER H. W. COWIE, C.M.G., seconded this, and it was carried.

On the proposition of Mr. W. B. FARQUHAR, seconded by Mr. GREW, the Auditors (Messrs. Monier F. Monier-Williams and Alfred Bevis) were re-appointed.

The CHAIRMAN proposed that the best thanks of the shareholders be given to the staff and workmen for the excellent services they had rendered to the Company. They had never had in their undertaking any trouble at all. They were on the best possible terms both with the staff and the workmen, and so long as this condition prevailed they would no doubt be able to give the proprietors a good return on their money. The Company were extremely well served by everyone.

The vote was seconded by Mr. BUDGEN, and passed heartily.

Mr. A. A. JOHNSTON (the Engineer and General Manager), returning thanks, remarked that any success which the staff had achieved might be attributed to excellent "team work." The staff were absolutely loyal, not only to their heads, but to the undertaking generally.

The proceedings terminated with a vote of thanks to the Chairman and Directors.

Millom Gas-Works Improvements.—The Millom (Cumberland) District Council Gas Committee have instructed Mr. Hoy, Gas Engineer, of Workington, to inspect the works and report on improvements necessary to bring the plant up-to-date. It is anticipated that the expenditure involved will be about £1150.

LIVERPOOL GAS COMPANY.

Cheaper Gas and Greater Consumption.

The Annual Meeting of the Company was held last Thursday, in the offices, Duke Street, Liverpool—Mr. H. WADE DEACON (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said the Company had power to declare a very much higher dividend than the 5½ p.ct. that was agreed to; but as theirs was a public utility service, the Board preferred to continue their established policy of maintaining a reasonable dividend, while endeavouring to sell as much gas as they could at as low a price as possible. In January, 1923, the price was 9d. per therm, in April it was reduced to 8·4d., in July to 7·8d., and in October to 7·4d., at which figure it stood to-day. There were three main reasons which had enabled the Directors to make these large reductions: First, the decrease in the cost of materials, especially coal and oil; secondly, increased income from residuals; and, thirdly, the increase in the quantity of gas sold. The cost of coal and oil, as shown in the revenue statement, was £632,483, as compared with £744,567 in 1922, a decrease of £112,084. On the other hand, the residual products had realized £339,742, as compared with £265,115 in 1922, an increase of £74,627. This was an unexpected result, and was largely due to the fact that, owing to the continuation of the disturbed political condition in the Ruhr area, large quantities of coke were exported at enhanced prices. Tar, also, had done much better than in the previous year; and residuals had altogether yielded 53·8 p.ct. of the gross cost of coal and oil, against a yield of 35·6 p.ct. in 1922. The quantity of gas sold had a very important bearing on the cost of production, and he was glad to say that last year there was an increase of 4 p.ct. This was a very satisfactory state of affairs, when one bore in mind the competition of the electricity undertaking of the Corporation and the general unsatisfactory state of business. The Directors had had under consideration for some little time past the position of the employees who were members of the superannuation fund. Owing to the greatly changed values brought about by the war, it was clear that what was before the war a reasonable superannuation retiring allowance had become insufficient under the new conditions. It was decided, after conference with the employees concerned, to make such modifications in the constitution of the fund as would meet the case. This naturally entailed increased contributions both from the employees and the Company. The Board decided to make an annual payment of £6735 for five years, in addition to the regular percentage contributions. After making a transfer of £20,000 to the special purposes fund, the account showed a balance of £219,330 to be carried to the net revenue account. Adding to this £72,109 brought forward, and general interest £7159, and deducting the interest on debenture stock and mortgages and the dividends for the two half-years, there remained a balance of £116,929 to carry forward to next year's account. Owing to the growth of business, the Directors had found it necessary to increase the gasholder capacity, and had made contracts for the erection of a holder at the Garston Works. The work was in hand, and the capital expenditure this year would naturally be much greater than it was last year.

The report and accounts were adopted, and a dividend for the half-year ended Dec. 31 of 2½ p.ct. on the ordinary stock (making 5½ p.ct. for the year) was declared.

Wandsworth, Wimbledon, and Epsom District Gas Company.

In submitting to the proprietors next Tuesday the accounts for the year ended Dec. 31, the Directors will report that they show an increase in the sale of gas of 5·7 p.ct. The number of consumers is increased by 1253, and the number of stoves and other appliances by 2724. The Directors regret to announce the death of Mr. H. S. Freeman, who was for nearly 30 years Engineer of the Wandsworth Company, and for the past 25 years a member of the Board. The Company's Act provides that the vacancy shall not be filled. The price of gas was reduced by ⅝d. per therm (equivalent to nearly 3d. per 1000 c.ft.) from midsummer last, and also by a further ⅜d. dating from Christmas. The Gas Referees have certified that the gas supplied during the year averaged 474·75 B.Th.U.; the declared value being 470. Capital was raised during the year—viz., £100,000 of new ordinary stock, £100,000 of 5 p.ct. preference stock, and £50,000 of 4 p.ct debenture stock, yielding the net sum of £228,298, or £21,701 below par values. The profit and loss account for the year, after providing for the interest on mortgages and debenture stock, and on deposits and loans for the past twelve months, and the dividends for the six months ended June 30, 1923, shows a balance of £62,111. The Directors recommend payment of dividends for the half-year ended Dec. 31 last at the following rates per annum: On the £100,000 of preference stock (raised in 1923), 5 p.ct.; on the £348,940 Wandsworth "C" stock (raised between 1900 and 1912), and the new ordinary stock (raised since 1912), £6 7s. 9d. p.ct.; on the £352,000 of Wimbledon stock (raised before 1912), £7 5s. p.ct.; on the £255,636 of Wandsworth "B" stock (raised between 1856 and 1900), £7 12s. 6d. p.ct.; on the £98,000 of Epsom stock (raised before 1912), £7 15s. p.ct.; and on the £30,000 of Wandsworth "A" stock (raised before 1856), £9 2s. 6d. p.ct.

Harpenden District Gas Company's Capital Issue.—Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., have received instructions from the Directors of the Harpenden District Gas Company to offer for sale by tender £7000 of additional capital stock, ranking for a standard dividend of 6 p.ct., subject to the sliding-scale, equally with the existing similar stock, on which the last dividend paid was £7 8s. p.ct. The minimum price fixed is £105 per £100 of stock, at which price the yield on the present basis will be £7 0s. 11d. p.ct. Growing demands necessitate the raising of this further capital. In the last decade the output of gas has more than doubled, the sales having gone up from 41½ million c.ft. in 1913 to over 85½ millions last year. Tenders must be sent in to the firm by Friday morning next, Feb. 29.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

The Annual Meeting of the Company was held on Tuesday of last week, at the Offices, No. 639, High Road, Tottenham—Mr. HENRY WOODALL in the chair.

The SECRETARY (Mr. E. J. K. Fussell) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

A SATISFACTORY STATEMENT OF ACCOUNTS.

The CHAIRMAN, in moving the adoption of the report and accounts, said: It is with pleasure we again meet you to give an account of our stewardship, and I trust that you will agree that the accounts we are able to put before you are satisfactory. As I have stated before, our position is not yet what we desire, as we have not been able to reduce the price of gas as we should have wished, although it is perhaps not unfair to remind you that the charge has been reduced since May, 1921—the time of highest price—by 4⅛d. per therm, which on our present output would mean £210,000 per annum. The main reason is that, at the outbreak of the war, our then Engineer, Mr. Broadberry, had made plans for very extensive improvements, alterations, and extensions. Some of these, in spite of great difficulty and cost, we were able to carry out during the war period; but we have not yet completed all our improvements. We are still altering meters, substituting larger ones, having decided to get rid of all the 3-light meters on our district—in all 50,000. This is, of course, a great expense, which must largely fall on revenue. Then we have outgrown our boilers and purifiers, and some of these have to be replaced, as well as sulphate and tar plants. I mention this to show you that for some time our charges against revenue for replacement must be high; the ultimate result, however, will be to the good of all concerned. Turning to the accounts, you will see that we have raised £100,000 of "B" stock, upon which we obtained premiums of over £4000. The net addition to capital expenditure (gas only) amounts to £108,915. This addition was almost entirely due to the cost of the new gasholder of 7 million c.ft. capacity, now in use and of great value, together with the large connecting mains and the new meters for replacement of old.

COAL DOWN AND RESIDUALS UP.

The revenue account shows a smaller balance than in 1922 by £5905, which is very satisfactory, when it is considered that the decrease in price, including revised discounts, accounts for £100,000. The great improvement is due mainly to two factors. The price of coal has gone down by 6s. a ton, and the price of residuals has gone up. In addition, we have had a large increase in output. The net cost of coal, oil, and coke in 1923 was 2·18d. per therm, against 3·39d. per therm in 1922—a difference of 1·21d., or £67,634. We can hardly expect quite such good figures for residuals this year; but we have bought our coal, and there will be only a slight increase in that. We may have something additional to pay for oil, but I hope not.

ELECTRICITY.

With regard to the electricity accounts, you will see that we have increased our capital by a net sum of £9494, spent almost entirely on extensions of mains. The balance of revenue account shows a slight increase, and a handsome return on our investment.

DISTRIBUTION.

During the year we have been giving great attention to our distribution system. In the early part of the year, we appointed a District Superintendent, Mr. S. B. Chandler; and the results in this department have been excellent. A very large number of new appliances have been fixed, and we have had a big increase in our high-pressure outside lighting. The increase in the sale of gas has been 8·76 p.ct. This is, I believe, the largest increase of any of the London and Suburban Companies, and is a tribute to our staff, while it shows also what a splendid and growing district we have—our greatest asset.

ASSESSMENT.

It will be remembered that in 1917-18 we appealed against our assessment, and it was then reduced by about 25 p.ct. The Rating Authorities have now rightly reviewed the situation, and have re-assessed us. The new assessment is higher than we think justified. Negotiations are taking place which we hope will result in a satisfactory agreement, but in any case an increase must be expected.

PENSION FUND.

This fund was started in 1914, but was not to operate for ten years. It has now come into operation, and already we have under it pensioned some of our old servants to our mutual satisfaction. The fund now amounts to upwards of £72,000; and in view of the fact that a large portion of it is contributed by the employees, your Directors decided to invest at least the contributed portion outside the concern. You will see that in the general balance-sheet the fund now stands at £41,872, but in addition there is about £30,000 invested, as you will see from the Pension Fund Account which has been sent to you. I feel sure you will approve the course we have taken. Working under the sliding-scale, and with our co-partnership arrangement and pension fund, our undertaking is now in as satisfactory a condition as we can hope for. As you know, our staff and workpeople as a rule remain with us all their working lives, and a man in whatever position, from Chief Engineer to the youngest stoker, can, if he leaves his bonus with us to accumulate at compound interest, and if the present rate of dividend is maintained, retire after forty years' service and claim a pension and stock which will bring him in as large an income as he would have had at work; and the cost of this to him out of his wages or salary is 1 p.ct. Take the example of a man earning £2 a week, and never improving his condition—a most unlikely case—if he joined the funds at 25, and worked till he was 65, he would have a pension of £1 6s. 8d. a week. He would also have accumulated capital—that is, if he invested all his free bonus in the Company—of £625, which, if our present rate of dividend is maintained, would give him in interest 15s. a week; so that his total income per week would be £2 1s. 8d., and his £625 of capital he could leave to his heirs. ["Hear, hear."] The cost to him out of his wages would be 5d. a week, and the rest would come out of his co-partnership bonus and the Company's contributions. It is not likely that all our men will be able to keep their bonus intact, earning compound interest. There are sure to be cases of illness and misfortune that will make demands on some, and we do not desire that thrift be carried so far as to undermine the well-known generosity of the British working man. But at the same time there is for all our men the chance of retiring at an age when they have plenty of vigour left, and being in an independent position, with the opportunity of doing good work and being useful citizens.

CO-OPERATION AND HARMONY.

A member of the present Government is reported to have said the other day that "the Labour and Socialist movement was opposed to bureaucratic control of industry, because it revolted against the feelings of the people, who were liberty loving, and because it was not possible to do it and get co-operation and harmony." If it would not be presumption on my part, I would commend the study of the working of our undertaking to this gentleman, and I think he would agree that, without loss of liberty, we do get co-operation and harmony. What is more, we have to consider the consumer. Before we can get any addition to our dividend, we must give to the consumer, nine times what we divide; then we all get a benefit (except only the Directors, or bureaucrats, who, however, are generously treated by you). The investor gets a fair return for his money and the worker the same, if, and only if, he is efficient; but the consumer gets the most consideration of all, and in what other trade is the consumer considered? We are a State-regulated monopoly, and it is not easy to see how the principles controlling us can be applied to other industries; but it is worth while to try if something on the same lines cannot be done, in which case many of the difficulties between Capital and Labour would be overcome.

STANDARD PRICE.

Our standard price is, as you know, 17⅜d. per therm, and would entitle us to pay 8½ p.ct. on the "B" stock, which is the bulk of our stock; but we are contenting ourselves with 6½ p.ct. The reason is that we realize the standard that was granted us in 1921 was granted at a time when the price of everything was high, and was not intended to enable us to pay a dividend such as it would enable us to pay to-day. Revision of standard price has begun, and our turn will come; and when it does we shall be prepared to justify the confidence that was put in us by the Board of Trade in 1921.

THE FINANCIAL RESULT.

Now to return to the financial result of our working—you will see that we are able to pay the same dividend as for the half-year to June; to transfer to the Insurance Fund £10,000; to pay the expenses of the issue of capital, £862; to transfer to the Electricity Renewals Fund, £2000; and then to carry forward £35,811—an increase of £1598. ["Hear, hear."] This, ladies and gentlemen, is, I think, a result which can be regarded with satisfaction. It is one that could only be obtained by the good work of all concerned. It gratifies more than it surprises those of us who know how keen and capable our officers are, and how cordially they work with those under their control. I now move:

> "That the report of the Directors and statement of accounts for the year to Dec. 31, 1923, be received and adopted, and that the report be entered on the minutes of the proceedings of this day."

Mr. G. HAY MORGAN, K.C., in seconding the motion, said he did not see that he could usefully add anything to the very lucid and full statement which the Chairman had given them. What had been said by Mr. Woodall about co-partnership, he hoped would be broadcasted among other industries, so that they might be tempted to follow the example of the gas industry in this respect.

A SHAREHOLDER remarked that he saw in the revenue account there was a large increase under the heading of "Repair and maintenance of mains and service-pipes, &c." Was this owing to greater expenditure on material or labour?

The CHAIRMAN replied that it was due to a bigger outlay in both respects. It merely meant that they had done more work.

Mr. H. F. PARDY, referring to the statement that 50,000 meters were being replaced by larger ones, inquired whether these meters were hired out or supplied free of charge.

The CHAIRMAN said they were nearly all slot-meters. In this case, the rent of the meter was paid for in the price of gas. As they were aware, a great deal more apparatus was now being used in houses than was formerly the case, and so the smaller meters had become incapable of passing the quantity required.

The resolution was then put to the meeting and carried unanimously.

THE DIVIDENDS.

The DEPUTY-CHAIRMAN (Mr. Henry Bailey) then moved:

> "That the dividends paid on Aug. 11, 1923, in respect of the half-year ended June 30, at the rate of 5 p.ct. per annum on the preference stock, 8 p.ct. per annum on the 'A' stock, and 6½ p.ct. per annum on the 'B' stock, all less income-tax, be and are hereby confirmed.
>
> "That a dividend at the rate of 5 p.ct. per annum on the preference stock, 8 p.ct. per annum on the 'A' stock, and 6½ p.ct. per annum on the 'B' stock, all less income-tax, be declared for the half-year ended Dec. 31, 1923, payable on and after Feb. 26, and that the dividend warrants be sent to the proprietors by post."

As had been stated, these were not the full statutory dividends they were entitled to pay, if they could earn them, but they were endeavouring as far as possible to reduce the price of gas to the consumer, and so could not expect more than the present rates of dividend, which he thought were very good.

Mr. H. D. ELLIS seconded the proposition, which was agreed to.

RE-ELECTIONS.

The CHAIRMAN, proposing the re-election of Mr. Henry Bailey as a Director, said Mr. Bailey was the Deputy Chairman of the Company and their oldest Director. He had already been a member of the Board for 29 years, and they all hoped he would remain one for another 29 years.

Mr. HAY MORGAN seconded, remarking that when he himself first of all joined the Board he served on both the Finance Committee and the Works Committee. Mr. Bailey was Chairman of the Finance Committee, and it was a great pleasure to work with him. He was a nice man to get on with, but he did not accept other people's opinions without grave consideration. They could not have a better man as Chairman of the Finance Committee and as a Director.

The resolution was agreed to, and acknowledged by Mr. Bailey.

The CHAIRMAN next moved the re-election as a Director of Mr. Surridge—the youngest member of the Board. Mr. Surridge had been with them some little time, and they had found him a most helpful colleague, as they had felt sure he would be.

Mr. A. E. BROADBERRY seconded. He said he had known Mr. Surridge for a great many years, and he had always proved a very wise counsellor, and an excellent guide, philosopher, and friend. Since he had been on the Board, he had done good work for the Company.

Mr. W. A. SURRIDGE, acknowledging his re-appointment, which was carried, assured the proprietors that he would always do his best to deserve their confidence.

Mr. W. B. FARQUHAR proposed the re-election of Mr. William Cash, the retiring Auditor.

Mr. F. W. CHURCH seconded this, and it was carried.

Mr. WILLIAM CASH, returning thanks, said all present knew that the Tottenham Company had always been a well-managed and progressive concern, and was in safe hands. As far as the accounts were concerned, he could assure them that they were in most excellent order.

Mr. W. G. BROWN proposed that the best thanks of the proprietors be given to the Chairman, Directors, and Auditors, and also to the officers, staffs, and workmen, for their services to the Company during the past year. Everything appeared to him to be above criticism. They were all delighted to hear that the pension scheme had been developed so satisfactorily, and wished other companies would adopt a similar plan.

Mr. S SANDELL seconded the vote, which was heartily accorded.

The CHAIRMAN returned thanks for the Board, remarking upon the happy relations existing in the Company. They satisfied the shareholders by giving them a fair dividend, and at the same time gave to the men proper remuneration for their work—and a little more than that for their efficiency. It was a great comfort to feel that all their officers and employees, if they stayed with the Company (as he was glad to say they generally did), would in their own old age be well provided for. Under these conditions everything went smoothly; and as the Company had a very fine district, which was, he supposed, developing as rapidly as any round London, they had a good future before them. They could feel that they were connected with an industry which was not in any way moribund, but which was being appreciated more than ever. They were exceedingly fortunate in having a most efficient, a most loyal, and a most able staff, and they were supported by as good a body of men as one could wish for.

Mr. FOSSELL, who also acknowledged the vote, said he would heartily recommend the staff to consider closely the remarks of the Chairman with regard to the pension fund and co-partnership scheme. It was really wonderful to see what a man could accomplish if he stayed with the Company—and they were encouraged to stay, because they always got praise for the good work they endeavoured to do. When they reflected that a man earning £2 a week to-day might retire at 65 and take £2 1s. 8d. a week as pension, and leave £625 behind for his heirs, it was no wonder that men grew old in the Company's service.

Mr. HAROLD C. SMITH (the Chief Engineer), on behalf of the engineering staff and workmen, thanked the meeting for the vote. The Company was one for which they were all proud to work, and it would hearten them much to find their services were so well appreciated. The co-partnership and pension schemes were greatly valued.

TRADE NOTES.

Tully Gas Plants, Ltd.

The French Agents of Tully Gas Plants, Ltd.—the Société Anonyme des Appareils de Manutention and Fours Stein, of Paris—notify the receipt of an order for one Tully patent gasification plant, with a capacity of 300,000 c.ft., for the Usine à Gaz, Biarritz.

Hot-Water Supply.

Messrs. Thomas Potterton, Heating Engineers, of Balham, S.W. 12, have issued a complete catalogue of hot-water supply and heating specialities, the prices of which have been revised throughout, and will be found to contain important modifications, rendered possible by improved methods of manufacture. The new publication is delightfully prepared, and the letterpress most informative.

Grays and Tilbury Price Reduction.—Intimation is made by the Grays and Tilbury Gas Company that the price of gas will be reduced by 1d. per therm as from the readings of the meters at Lady Day.

Newmarket Gas Company.—The annual meeting of this Company was held on Feb. 18. Mr. R. Stephenson, J.P., D.L., presiding. The accounts show a balance of £5128 brought forward from the previous year. The profit earned during the year ended Dec. 31, 1923, is £6628, making a balance at the credit of the profit and loss account of £11 757. The Directors recommended a dividend at the rate of 7½ p.ct. on the consolidated stock, less income tax, leaving £8297 to be carried forward to the next account. The price charged for gas during the year was 1s. 1d. per therm, and this has been reduced to 1s. Mr. J. L. Jarvis (a Director of the Company) paid high tribute to the work of Mr. J. H. Troughton (Manager and Secretary).

HORNSEY GAS COMPANY.

The Annual Ordinary General Meeting of the Company was held last Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

AN EXCELLENT STATEMENT OF ACCOUNT.

The CHAIRMAN, in moving their adoption, said the proprietors had for a long time past been accustomed to the presentation on occasions such as this of a satisfactory statement of account, but he ventured to think that the report which the Directors had to make to them that day represented a considerable advance and improvement upon anything that they had been able to do in the same way in the past. These results were simply the outcome of sedulous and continued endeavour on the part of the Board and the executive officers—on the part of the Board, to outline the technical and commercial policy, to which they had adhered through times of great difficulty and embarrassment; and on the part of the executive officers, to carry out the purposes of the Directors, with what he might term most excellent results. As was stated in the report, the sales of gas during 1923 exceeded in volume those of the preceding year by 3·3 p.ct. Shareholders might be inclined to say, thinking of other undertakings, that this was not a great deal to make a song about, but it had to be judged by the peculiar circumstances of their Company. A great many undertakings that had not sought new business, or at all events had not taken any special measures to secure it, had had it thrust upon them by the development of new building estates, and where this occurred a large increase in business followed automatically. But there was nothing whatever of this kind in connection with their Company. He did not say that there was not some sporadic building going on, for this, of course, was inevitable, but big schemes were conspicuous by their absence. So far as the Hornsey Company had acquired an extended business, it had been done by inducing the consumers to use a larger quantity of gas—and there was a very powerful inducement to their consumers to burn gas.

A LARGER DIVIDEND.

The paragraph in the report which related to the distribution of profit showed that they were able to give the proprietors a somewhat larger dividend. Of course, as they went up the scale of dividends, the increments must necessarily become smaller and more difficult to confer. Therefore the Board hoped the proprietors would be gratified at the fact that the Board had been able to give them an increase in these difficult days—being assured that this course would not have been taken without reasonable assurance of the higher rate being maintained in the future. Of course, this was not positive, but any Board would hesitate to increase a dividend unless the probabilities were that this increase could be maintained; and that was the case here.

GAS PRICE REDUCTIONS.

Then the report went on to refer to the price of gas. This was reduced at Lady Day from 9d. to 8½d. per therm, and as from the Michaelmas quarter to 8d. per therm. Going back to Lady Day, 1922, it would be found that as between that date and Michaelmas, 1923—a period of eighteen months—the price of gas had been reduced by no less than 3d. per therm, and 3d. per therm was equivalent to just over 14d. per 1000 c.ft. The difference financially to the consumers was that if they consumed the same quantity of gas now as they did before, there would be a saving to them of over £46,000 in a year. It must be admitted that this was a very impressive and important figure. It was remarkable that they should have managed to reduce the price of gas to this extent within a space of eighteen months, and personally the Board were rather pleased with it. It was a big accomplishment, of which they might be justly proud—particularly seeing that they were able to show a margin of profit sufficient for the distribution of an increased dividend. He did not think that the consumers would be angry with the dividend; and he was sure the proprietors would be pleased that the consumers should have received such a very large proportion of the economy resulting from the Company's administration during that period. Comparisons were always odious to one party or the other, but one could never escape them. The commercial man would always have to live in an atmosphere of comparison; and when their Company in other days failed to give gas at a figure which was thought sufficiently low, there were rained upon them comparisons with what other people were doing in their vicinity. Well, the Hornsey Company were now selling the cheapest gas on the North side of the Thames, and as cheap as any on the South side. Theirs was not a very large undertaking, and they did not enjoy the privileges and the opportunity afforded to bigger ones in their commercial transactions. All their coal was brought to them by rail. Remembering these things, and realizing that they had succeeded, and by no inconsiderable margin, in selling gas at the cheapest price on their side of the river, they had every reason to feel satisfied.

THE CO-PARTNERSHIP.

The next paragraph of the report was short, but extremely significant. It said: "The co-partnership system as sanctioned by the proprietors has now been brought into successful operation." The Board only sought to obtain the sanction of the proprietors to this some few months ago; but they had, prior to that time, very carefully thought out and defined the particular form of co-partnership that they proposed to extend to their employees. They were, he might say, not without experience in the matter. There was the experience of various other gas undertakings to go upon, and the scheme as promulgated by their own Company reflected this accumulated experience. He thought it was a thoroughly good scheme, and it was certainly borne out by the success of other similar schemes. After many years' experience himself in dealing with labour, he was convinced that they had simply taken a step which would have to be taken generally throughout the country, or the difficulties with which they were too painfully familiar to-day would become accentuated to the point of

being impracticable. The principle underlying this was not profit sharing—that could be done in many different ways. It was something far more than that. It was co-partnership, and it imposed on all the co-partners the duty of responding to the opportunities afforded them in connection with the undertaking. The Company provided the co-partnership money for the co partner. This scheme took nothing from him. He was paid the full measure of his labour at the highest current standard, and the co-partnership money was superadded. The Company wanted his sympathy, his co-operation, and his identity with the working, and the Board thought this was the best possible way to secure it. If they could only obtain this from the co-partners—and he felt sure they would—then the co-partners on their part would be surprised at what it would bring to them, and the proprietors would be surprised at the improved efficiency that it would impart to the efforts of the Company. Outside all these things, he did hope the proprietors would not fail to realize the difficulties and dangers which would be avoided, and which they would never hear of, because they would not come about. Co-partners had a share of the responsibility and a stake in the Company, and they would give the undertaking the benefit of their intelligence and of their interest to an extent which could not be expected unless they had this new scheme conferred upon them. It was a great idea, and he hoped the proprietors and the co-partners would all try to push and promulgate it. Its object was to make a capitalist of everyone. A man who had nothing in this world—an empty stomach and an empty pocket—with no prospects, was a danger to everyone. It did not matter whether he was a good man or a bad man, he was equally a danger. He would like to see the system extended generally, and the basis of national competence and contentment thereby widened.

THE ACCOUNTS.

There were very few points in the accounts to which he need refer. There remained to be issued, under powers conferred upon them, £120,000 of capital stock and £34,500 of loan capital; but not a farthing of this would be issued unless the Board were absolutely obliged to do so. There was no immediate necessity for taking this step. In the aggregate of these accounts, they had received, or were purported to have received, £276,563; but there was £25,000 of this money which, while they had received it in a sense, was not a burden upon them, as they did not have to pay any interest or dividend whatever on it. The consumers got the use of this £25,000 in supplying gas for nothing. Deducting this sum from the capital received would bring it to about £346 per million c.ft. of gas sold. There were very few companies which could compare favourably with this figure; and this was the bedrock of the success of their undertaking. On the credit side of the revenue account, they had received during the year £18,639 less for gas and meter and stove rentals; but residuals had brought in £2670 more—not a very important increase. He said this because the prosperity he had noticed in connection with several other undertakings this year had been accompanied by an abnormal increase in the returns from residuals. It seemed as though the Hornsey Company must have looked after their affairs very well in the preceding year, because they had not done so much better in the past twelve months. The returns from tar had increased about £4000; and the sulphate figure was extremely good, because it showed that they had produced sulphate at the rate of rather more than 1 ton per 100 tons of coal carbonized. They had realized the satisfactory net profit of £6 4s. 6d. per ton. On this side of the revenue there were reduced receipts to the extent of £15,915, while on the other side there was a reduced expenditure of £19,262, and the profit had been augmented by £3317. With regard to the debit side of the account, maintenance charges aggregated about 1s. per 1000 c.ft. of gas. This sum might be completely inadequate for some undertakings, but was certainly not so in the case of the Hornsey Company. This question of the condition of the works and the value of the assets entered largely into a matter to which he had just been alluding—namely, the capital employed per million c.ft. of gas sold. A low capital per million was no credit unless the works were in a good condition and the assets were sufficient to carry on the business. All these requirements were satisfied in the case of their Company. The proprietors might do worse than spend a day in going over the Hornsey Works, when they would be able to satisfy themselves as to the truth of what he had said. Law charges were conspicuous by their absence. The legal position of gas undertakings—especially with regard to the public authorities—was more precarious and more difficult now than ever it was. The industry had come under new legal enactments, and there were constant changes in the law affecting the position in many ways. Among the many requirements of a director, therefore, was the possession of a sensitive appreciation of the legal position of his company. Gas companies generally must be prepared in the future for expenditure in this respect considerably in excess of what they had incurred in the past, if everything was to be properly safeguarded. Before showing the profit and making the appropriations which it was proposed in the report to do, there had been carried to the benefit fund £691. to co-partnership £1613, and to the special purposes fund £1000. Whereas they brought £16,065 into account, they were going out with £17,629, thus adding to the carry forward £1564. The balance-sheet he thought everyone would agree was a favourable one.

AS TO THE FUTURE.

The proprietors would perhaps be somewhat concerned as to the future. They would have gathered from what he had already said that the Company's possibilities of extending the sale of gas were not so naturally great as was the case in some other quarters, and that the Company must rely upon making gas more acceptable to the existing consumers, rather than depend upon any large increment of new ones. They had already accomplished a good deal in this way by the reduction in price. Gas at 8d. per therm offered a very attractive commercial proposition to the consumer, who was likely to use it for more purposes than he would if the price were higher. He held the view that the future of the industry mainly depended upon getting those who now consumed gas to use it to a greater extent, and they would not do this with gas at the price which at present generally obtained. If, however, the charge could be brought down, not to what it was before the war, but to a more favourable relationship with coal and other alternatives, he did believe that the use of gas would be enormously extended without the acquisition of any new consumers at all. This was their strength. There was a huge amount to be accomplished yet, and it would be accomplished when the uses of gas were better understood, when the appliances were still further improved, and finally when the price of gas was reduced to a lower level.

The DEPUTY-CHAIRMAN (Mr. A. F. Phillips) seconded the motion, which was unanimously carried without discussion.

THE DIVIDENDS.

On the motion of the CHAIRMAN, seconded by Mr. J. M. MILES, it was agreed—

> That there now be declared dividends for the half-year ended Dec. 31, 1923 (being the final dividends for the year), as follows: On the preference stock, 5 p.ct per annum; on the consolidated "A" stock, 13 p.ct. per annum; and on the consolidated stock, 10 p.ct. per annum, all less income-tax (making with the interim dividend already paid on the "A" stock and consolidated stock respectively 12½ p.ct. and 9⅜ p.ct. for the year); that such final dividends be paid on March 1; and that the sum of £1000 be carried to the reserve fund.

OTHER BUSINESS.

Mr. PHILLIPS proposed the re-election as Directors of Mr. A. M. Paddon and Mr. G. W. Carey. He remarked that the Chairman paid the greatest attention to the business, and analyzed every detail connected with the working. Mr. Carey was a most able accountant, whose services were of the utmost value.

Mr. F. H JONES, seconding, remarked that, besides being an extremely able man, Mr. Paddon was very nice to work with, and they were altogether a most harmonious Board. Mr. Carey did excellent work.

The proposal was agreed to.

The CHAIRMAN next proposed that the remuneration of the Directors, as and in the manner now paid, be increased by £450. He said that, knowing all the circumstances, he thought this motion would come best from him. Some five years had elapsed since the proprietors last favoured the Directors with an increase in their fees, and during that time the business had increased by about one-third. This meant an addition to the responsibilities and duties connected with the Company—which was the main ground upon which an increase in remuneration to the administration should be granted. Their undertaking was continually developing, and at present it was increasing at a rate which it had never done before during his experience of 23 years. He felt therefore it was not unreasonable that they should ask the proprietors to recognize the greater demands made upon the Directors by increasing their remuneration. By doing this the proprietors would not only gratify the members of the Board, but would serve a useful purpose of policy. If the undertaking was to maintain its position after the present Directors had gone, it would be necessary to replace them by others well qualified to uphold its traditions, and this could be best assured by making the position attractive.

The proposition was seconded by Mr. H. P. BODKIN, and heartily endorsed by those present.

On the proposition of Mr. E L. BURTON, seconded by Mr. W. RICHARDS, the retiring Auditor (Mr. H. A. Floate) was re-appointed.

The CHAIRMAN, proposing a hearty vote of thanks to Mr. Buckley, Mr. Roberts, and the other officers and servants of the Company, for their work during the past year, said he could not devise anything to say of Mr. Buckley by way of compliment that was not better expressed by the accounts themselves. He was a really exceptional officer—in fact, one of the ablest whose services they could possibly obtain. Mr. Roberts also was a most faithful servant, who sacrificed himself to the affairs of the Company.

Mr. G. W. CAREY seconded the vote, and said they were all glad to see representatives of the employees present at the meeting for the first time.

The vote was heartily passed.

Mr. J. W. BUCKLEY (Engineer and General Manager), on behalf of the officers, expressed appreciation of the vote. No one in England had been the means of introducing co-partnership to a greater number of companies than Mr. Paddon. Referring to Hornsey's cheap gas, Mr. Buckley said it had always been his endeavour to be connected with undertakings selling gas at a low price. He trusted the day was not far distant when they would be able to make a further reduction.

Mr. GODWIN, one of the employees, remarked that the scheme of co-partnership had made a very fine impression.

The proceedings closed with a vote of thanks to the Chairman and Directors, which was proposed by Mr. BURTON.

Flint Council and the Gas-Works.—It was reported at a meeting of the Flint Town Council last week that the Finance Committee had discussed the question of the Council taking over the gas and water undertaking, and had decided that for the present the matter should be deferred.

Trade Cookery and Industrial Gas Rates.—The Bradford Corporation Gas Committee, in response to an application by the local Fish Friers' Association, have decided that fish friers, bakers, and others who use gas for trade cooking purposes shall be supplied at the industrial rate, which is 7d. per 1000 c.ft. less than the ordinary rate of 4s. per 1000 c.ft. This reduction does not apply to cookery in private houses. The gas for trade cookery is to be supplied through special meters.

Cheaper Gas at Leeds.—The Leeds Corporation Gas Committee, on Friday, decided to reduce the price of gas for domestic and lighting purposes by 3d. per 1000 c.ft., with proportionate reduction in the scale of charges for industrial uses. For domestic use and works lighting the price will be 3s. 9d. per 1000 c.ft., or 9·57d. per therm; for motive power and furnace work it will be 3s. to consumers of less than 100,000 c.ft., and 2s. 5d. to consumers of over that amount. It is estimated that the profit on the year's working will be £27,440, despite an increase of £31,020 in the cost of coal.

CROYDON GAS COMPANY.

The 152nd Ordinary General Meeting of the proprietors of the Croydon Gas Company was held last Friday evening, when Mr. WILLIAM CASH, who succeeded Mr. Charles Hussey as Chairman last year, presided.

As compared with 1922, the sale of gas in therms showed an increase for 1923 of 8·14 p.ct. During the year the number of consumers increased by 1855, and in the same period the increase in gas appliances supplied by way of sale or hire had been 10,992. The price of gas had been reduced by 1d. per therm, making the charge in the Croydon district 9d. per therm; and the Directors were pleased to announce a further reduction of 0·2d., with effect from April next. The reductions effected since 1921 amounted to 5d. per therm, and the gain to consumers, calculated on the sales of 1923, represented £226,825 a year, the new price being only 52 p.ct. above pre-war. The Directors recommended that dividends be declared for the half-year at the following rates p.ct. per annum, less income-tax: Preference stock, 7½; sliding-scale stock, 6½; and maximum dividend stock, 5—leaving a balance of £22,038 to be carried to the next account.

The CHAIRMAN, in moving the adoption of the report and accounts, said he appreciated very highly the honour his colleagues on the Board had done him in asking him to take Mr. Hussey's place. The sales of gas for last year, expressed in therms, showed an increase of a little over 8 p.ct. on the previous year, which, in turn, was 9 p.ct. increase on 1921. No less than 96 certificates had been granted to employees who had been with the Company for 25 years and upwards, and the pensions fund now amounted to £77,650, of which £45,000 was invested in outside securities. The daily tests made by the official gas examiner showed that the Company's statutory obligations had been completely complied with. The relations of the Board with the employees were excellent. There was rapid development in the building of all description of houses in all parts of the district, and it had become necessary to consider the erection of new showrooms and workshops at Purley, and to extend the already commodious premises at Wellington and Norbury. Large expenditure in the extension of mains was contemplated, in view of the great growth of Croydon and its environments; and the Company were endeavouring to work in conjunction with local authorities in regard to causing as little inconvenience as possible in disturbing the roads.

Sir ERNEST LAMB, one of the largest stockholders, congratulated the Directors on the magnificent progress of the Company.

The report and accounts having been passed, the resolution declaring the dividends was unanimously accepted; and Messrs. W. Cash, Percy H. Hall, and William J. Russell (who has been associated with the Company for over 60 years) were re-elected Directors. Mr. Fredk. S. Sloman was re-elected Auditor.

Mr. ARCHIBALD CADDICK (Engineer and Works Manager), replying to a vote of thanks to the officers, staff, and workmen, remarked that he thought they had never had a year of greater fluctuations in temperature than 1923. There had been a difference of 20° in 24 hours, and this meant that a very big consumption of gas had to be provided for. The Company broke all records last year; the consumption for one day approximating 10 million c.ft.

Mr. WM. J. SANDEMAN (Distributing Engineer and Sales Manager), who was stated to have a national reputation for the competence of his department, also replied.

CHESTER UNITED GAS COMPANY.

The Ordinary General Meeting of the Company was held last Monday, Sir J. M. FROST, J.P., the Chairman, presiding. The accounts show that, after payment of dividend on ordinary stock to Dec. 31, 1922, and provision for income-tax, there was brought forward a net balance of £6715, to which was added £20,032 (the profit realized on the working for the year 1923), and £954 interest on amounts deposited—making a total of £27,703. Out of this the Directors have provided for the payment of interest on temporary loans and debenture stock amounting to £3250, and dividend on preference stock of £2100. The Directors recommended the payment of a dividend of 2½ p.ct. on the ordinary stock in respect of the half-year ended Dec. 31, 1923, making the basic rate of dividend of 5 p.ct. for the year. The price of gas has been below the basic price; and an additional dividend of 15s. p.ct. on the ordinary stock in respect of the past year has been recommended. A corresponding sum has been placed to the credit of the co-partnership fund. The calorific value of the gas has been increased from 460 to 475 B.Th.U. per c.ft., as from Dec. 15, 1923; and a further reduction in the price—from 9d. to 8·4d. per therm—has been made, taking effect from Dec. 31 last.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, with the exception of receipts from gas and residuals, and cost of coal, there was no great divergence from last year's figures. The sale of gas was highly satisfactory; the quantity sold being 1,660,486 therms, as compared with 1,546,622 therms for the previous year—an increase of 7·35 p.ct. Another good feature was that the sales amounted to 61·8 therms per ton of coal carbonized, compared with 58·8 therms in 1922. The receipts from residuals were good, and showed an increase of £4600. Tar realized abnormally high prices, resulting in an increased return of £4200; and sulphate accounted for an additional £600 on the figure for the previous year. During the year they had had a house-to-house examination of the fittings, and had tested the meters in nearly one-half of the consumers' premises. Another item of interest was that the new gasholder erected by Messrs Newton, Chambers, & Co., Ltd., had been brought into use last December. Their co-partnership scheme had been in operation for over twenty years, and they had derived great benefit from it. Not only did it encourage thrift among the employees, but it was a useful medium for closer relationship between employer and workman.

On the same day an extraordinary meeting was held, when the CHAIRMAN formally moved that "the Company do hereby approve and sanction a scheme enabling the employees to participate in the profits of the undertaking in accordance with section 32 of the Chester Gas Act, 1922."

RAILWAY RATES ON COAL.

The Abolition of the Flat Rate.

The inquiry into the application of the Mining Association of Great Britain and the National Association of Coke Oven and By-Product Plant Owners, for the removal of the flat rate of 2d. per ton on coal, coke, and patent fuel, has now been completed; and the judgment of the Railway Rates Tribunal is awaited. The application is made against the four large railway companies of the country, and the Cheshire Lines Committee. The case for the Mining Association was dealt with in these columns when the inquiry was opened [see "JOURNAL" for Jan. 2, p. 40].

The proceedings were resumed after the Christmas vacation, and new figures were placed before the Tribunal on behalf of the coal trade. Much prominence has been given to statistics purporting to show that, whereas in September, 1920 (when the rates on coal were increased by 100 p.ct. over pre-war rates, and a flat rate addition of 6d. per ton, irrespective of distance, was made), the coal trade provided 27·1 p.ct. of the increased railway revenue, the percentage of the revenue that the trade provides at current rates (which are 50 p.ct. above pre-war, *plus* a flat rate of 2d. per ton) is 58·4. It was also stated that, even if the application for the removal of the flat rate were acceded to, the trade would still be providing over 50 p.ct. of the increased revenue of the railway companies. It is pointed out by the railway companies, however, that the coal traffic has increased considerably, and that, assuming the coal traffic at present bears the same proportion to the total traffic as it did in 1920, the trade is only providing 31·2 p.ct. of the increased revenue. But the railway companies do not uphold the proposition that particular industries should provide a fixed proportion of the revenue for all time, because, if that were so, it would mean that, if a trade were depressed, and the traffic was less in consequence, it would have to pay higher rates in order to provide its assigned proportion of the revenue.

Another view put forward by the coal trade is that reduced rates on coal will stimulate traffic, and that an increase of 5 p.ct. in coal traffic would repay the railway companies for the loss of revenue following the abolition of the flat rate. The railway companies, however, consider that the coal traffic would have to be increased by 20 or 25 p.ct. to make good the loss, and that (to use Counsel's words) the stimulation would have to be carried almost to the point of intoxication.

The railway companies attach considerable importance to the terms of section 60 of the Railways Act of 1921 (under which this application is made), and point out that, although it gives the Tribunal power to "reduce" rates, it does not give power to "abolish" the flat rate, which is a specific mode of charge. It was hinted by Counsel that if the application of the coal trade were granted, the railway companies might raise this legal point in another place, with a view to having it disallowed.

Again, it is urged by the railway companies that, in view of the fact that the Tribunal is shortly to make a general survey of the whole question of railway rates, in order to fix new standard rates, the coal trade is trying to "steal a march" on that inquiry, so that it would have the advantage of saying, when that inquiry is held, that the flat rate already stands condemned. If the Tribunal granted the present application, the position would be that, though the flat rate was a proper rate in respect of other traffic, it was not so in respect of coal—an anomalous position.

One of the points made by the coal trade in asking for this relief was that, as coal is the basis of industry, it should have special consideration over other traffic. The railway companies, however, say that they have given special reductions in rates to certain industries which were depressed, whereas the coal industry is prosperous. Assuming any relief given to coal were handed on to other industries, then it would mean that an industry which used large quantities of coal, but which happened to be prosperous, would reap more benefit from the decrease in coal rates than an industry which did not use much coal, but which happened to be depressed. It was much fairer, therefore, that the railway companies should be able to carry on the policy they had in the past—namely, to give reductions to industries which were depressed, in order to assist them to get back to normal conditions.

As to costs of working traffic, a good deal of the coal traffic is conveyed over comparatively short distances, which the railway companies say costs more to work than long-distance traffic. The flat rate, which is a charge imposed irrespective of distance, has a greater incidence upon short-distance than long distance traffic; and it is put forward by the railway companies that, in fact, this was the intention when it was imposed, in order to level-up the remunerativeness of the two traffics. The coal trade challenged the statement that the short-distance traffic was comparatively costly to work, on the ground that its density, and the ease with which it was dealt with, enabled economies to be effected. It was said by the railway companies that, if the flat rate were removed, then long-distance coal traffic would be prejudiced as against short-distance coal traffic. Indeed, the Hull Chamber of Commerce were represented before the Tribunal, their view being that, as the coal shipped from Humber ports has to travel long distances over the railways as compared with coal shipped from the Tyne ports, for instance, which are competitors, the Humber ports are prejudiced. They supported the application for a percentage reduction. Counsel for the Mining Association, however, laid stress on the fact that the Association represented the whole of the coal trade, and that more importance should be attached to their views than to those of the Hull Chamber of Commerce. Besides, it was urged, if the trade had to provide a certain percentage of railway revenue, then the question of one class of traffic being prejudiced as against another was a domestic matter for the trade itself. The railways would not lose by it. Many tables were put in by the railway companies to show the relatively

high cost of short-distance traffic; but the applicants held that they did not prove that this was the fact, owing to the absence of details.

Evidence was called on behalf of the London, Midland, and Scottish and the London and North Eastern Railway Companies only. Counsel for the Great Western and the Southern Railways intimated that, so far as a case could be made out against them on the general figures put forward by the Mining Association, applying to the country generally, they were prepared to let it stand. But they pointed out that, although the application of the Mining Association was made against each of the railway companies individually, practically no evidence had been given with regard to the coal traffic on their railways, which was worked under conditions which differed from those on the other railways. For the Great Western Company, it was pointed out, also, that quite recently the Tribunal refused an application by South Wales and Monmouthshire coalowners to abolish the flat rate on shipment coal in South Wales. Counsel quoted figures to show that the bulk of the coal carried on the Great Western Railway is South Wales coal, and also that the greater part of it is for shipment purposes.

When the inquiry was concluded, it was intimated that judgment might not be given for some time.

GOSPORT GAS AND COKE COMPANY'S ORDER.

Proposed Acquisition of the Fareham Gas and Coke Company.

An inquiry into an application by the Gosport Gas and Coke Company for a Special Order under section 10 of the Gas Regulation Act, providing for the amalgamation of the Company with the Fareham Gas and Coke Company, was opened by Mr. H. C. HONEY (Director of Gas Administration) at the offices of the Board of Trade last Wednesday, and was adjourned until yesterday.

The promoters were represented by Mr. JACQUES ABADY. The Gosport Corporation raised an objection in the interests of the consumers of Gosport, and were represented by Mr. F. J. WROTTESLEY. The Fareham Urban District Council, represented by Mr. ROWAND HARKER, had raised objections, chiefly with regard to the differential price to be charged as between Gosport and Fareham; but these objections were disposed of mainly by agreement between the parties—subject, of course, to the approval of the Board of Trade. The Southern Railway Company objected, and were also represented by Mr. HARKER, but the points raised are clause matters. The final objection was by the Misses Broadbank, represented by Mr. L. N. BLAKE on the ground that the new works, for the erection of which powers are sought in the Order, will depreciate the value of the property of the objectors, which adjoins the lands concerned; but Mr. Blake intimated that it is probable an agreement will be reached.

Mr. ABADY, opening the case, said it was proposed that the Gosport Company should acquire the undertaking of the Fareham Company. The former Company was a very much larger undertaking than the Fareham, and was able to manufacture gas much more cheaply; and it was proposed that the gas for supplying both Gosport and Fareham should be manufactured at the Gosport Works, thereby enabling a supply to be afforded in Fareham at a much lower price than that at which it could be supplied by the Fareham Company. It was not possible to charge the same price in both districts, owing to the extra costs of distribution by high pressure to the holder at the Fareham Works. Careful estimates had been made, however, and it was found necessary, in order to equate these costs, to charge in Fareham a price 3d. per therm in excess of the charge in Gosport. Further, the extra distribution costs included certain annual charges in respect of costs which were redeemable; and by the redemptions being effected annually it would be possible to reduce the differential of 3d. by successive steps of 0·2d. per therm per annum, until the differential was reduced to 1·2d., which would be in ten years. Under section 8 of the Gosport Gas Act of 1908, a differential was authorized in parts of the Gosport Company's area, amounting to 1·2d.; so that the effect of the present proposals would be that in ten years' time the consumers in Fareham would be charged the same price as the outlying consumers in the present Gosport area. The original proposals of the draft Order did not provide for a diminution of the differential in Fareham; but conversations had taken place between the promoters and the Fareham Urban District Council, with the result that the proposals in that respect had been amended; and he was happy to say that he was supported by the Fareham Council, who asked the Board of Trade to give effect to the draft Order.

As to the history of the Gosport undertaking, it was incorporated in 1865, and by its Act of 1908 the capital was consolidated, and further powers given. The present area of supply is the borough of Gosport and two outlying parishes. The Fareham Company were also incorporated in 1865, and obtained further powers by their Act of 1902; the present area of supply being the town and parish of Fareham, which adjoins the Gosport district. The two districts are connected by railway and tramway, and building development is taking place between the towns, thus closing up the area, though there are Government establishments, the existence of which will prevent the district being made absolutely compact in all directions. But the Directors of the Gosport Company took the view that the Fareham district is the natural one for the development of the Gosport Company; and if it could be shown (as he believed it could be) that the result of the Order would be to reduce the price of gas in Fareham, and tend to reduce the charge in Gosport, and that the financial proposals were within the capacity of the Gosport Company, then he asked that assent should be given to the Order, as being in the public interest.

The issued capital of the Gosport Company, share and loan, is £99,125, exclusive of premiums, and the capital of the Fareham Company is £20,900, exclusive of premium. The unissued ordinary and loan capital of the Gosport Company is £27,195, and Fareham £23,136. In consequence of the proposal that the Fareham shareholders should have issued to them stock in the Gosport Company on which a lower rate of interest is payable than in respect of the present Fareham shares, when the amalgamation is effected, the combined issued loan and share capital of the Gosport Company will be £126,325; and it is asked that the unexercised capital powers of the Fareham Company shall be transferred to the Gosport Company, so that there will exist authorized powers to issue £50,531, which is the summation of the unexercised capital powers of the two Companies. Some objection had been taken to the transference of the unissued capital powers of the Fareham Company; but the figures showed that the proposal was a reasonable one.

The sale of gas in Gosport is 183,000,000 c.ft. per annum, and in Fareham 28,000,000 c.ft.; the capital per million in Gosport being £466, and in Fareham £770. One penny per 1000 c.ft. represents £763 in the Gosport district, and between £117 and £118 in the Fareham area. The standard price in Gosport was fixed by the Act of 1908 at 3s. 6d. per 1000 c.ft., and by an Order of the Board of Trade in May, 1923, the figure of 12·2d. per therm was substituted. The standard price in Fareham was fixed by the Act of 1902 at 4s. 3d. per 1000 c.ft., and, by a Board of Trade Order of April, 1923, the figure of 16·6d. per therm was substituted. Therefore, while the pre-war standard prices differed by 9d. per 1000 c.ft., the present standard prices differ by 4·4d. per therm, which, using the figures of conversion that were applied when the Orders were made, leaves a difference of 2s. 2d. per 1000 c.ft. The differential price in the outlying area at Gosport was altered from 6d. per 1000 c.ft. to 1·2d. per therm. At present, the price in Gosport is 10·8d. per therm, and in Fareham 16d. per therm; and the effect of the Order, as amended, will be that the consumers of Fareham will, from the commencement of the Order (July 1, 1924) be charged 13·8d. per therm, which will be subject to decrease or increase if reduction or increase is made in Gosport. The declared calorific value in Gosport is 400 B.Th.U., and in Fareham 450 B.Th.U. The terms of the amalgamation are as follows: There is issued by the Fareham Company £10,000 of 8 p.ct. ordinary stock; and £160 of 5 p.ct. preference stock in Gosport will be given for every £100 of the Fareham stock. There is issued £750 of 7 p.ct. Fareham ordinary stock, for which will be given £140 of 5 p.ct. preference stock of the Gosport Company for every £100 of Fareham stock. There is issued £6800 of Fareham 5 p.ct. preference stock; and an equivalent amount of 5 p.ct. preference stock in Gosport will be given. There are £3350 of 6 p.ct. mortgage bonds issued in relation to the Fareham undertaking, which will be replaced by the same amount of mortgage bonds bearing the same interest in the Gosport Company. In addition, the provisional agreement provides for the payment to the Fareham shareholders of £3200 in cash; compensation to Directors amounting to £2250, and to the Manager £4500. When the value of the Fareham undertaking was being assessed by the Gosport Directors, it was shown that there existed a surplus of assets; and the existence of this surplus—which, of course, will be transferred to the new undertaking—was one of the considerations which moved them to agree to the terms stated.

Dealing with the objection of the Gosport Corporation, Counsel said that the Town Clerk had pointed out that as between 1913 and 1923 there had been a large increase in the capacity of the Gosport Gas-Works. This was true, and it was one of the reasons which had actuated the Company in promoting this Order. As to that reason there was no dispute. If the Gosport Company, who have an efficient works—he believed that was also admitted—had an unused capacity, what better could be done with it than to employ it in making gas for distribution to a district such as Fareham, where it was not possible to produce gas at anything like the same figure as that at which it could be made in Gosport? It was proposed to close the Fareham Works and distribute by a boosting plant and high-pressure main to the holder at Fareham. The view was that the result of the authorization of this deal would be to reduce the cost of manufacture at Gosport, by the use of plant at present unutilized, thereby lowering overhead costs. Therefore, it would hasten the further reduction of the selling price in Gosport—because Gosport was subject to the sliding-scale—stimulate demand, and contribute to a further reduction in costs. The price in Fareham would also be reduced, and the demand there would be stimulated, and lead to a further reduction in costs. Those advising the Gosport Company were satisfied that the differential proposed would cover the extra cost of supply in Fareham, and that the differential was not unreasonable. If that were so, then the apprehension of the Gosport Corporation—that the Gosport Company were taking on an obligation which would result in a loss, which loss would be thrown on the Gosport consumers—was entirely unjustified.

Counsel then asked for an amendment of the Board of Trade Order of May 10, 1923, with respect to the charges to prepayment consumers in Gosport. Section 5 of that Order authorized an extra charge for hire of 2·6d. per therm where there was a cooker, and 2d. where there was not. Those figures were arrived at from the pre-war differentials, which were 13½d. and 10d. per 1000 c.ft. When the schedule was submitted, the income budgeted for was calculated upon the income received on the 13½d. and 10d. basis; but the declared value of the gas was 400 B.Th.U., and in consequence of this, and of the conversion from 13½d. and 10d. to 2·6d. and 2d. per therm respectively, the income received per therm had been very materially less than that which was budgeted for. Therefore, he asked that, for the 2·6d. and 2d. in the 1923 Order, there should be substituted 3·4d. and 2·4d.

Next, Counsel dealt with the objection of the Gosport Corporation, in which it was stated that the Company's works had recently been completely re-equipped with almost entirely new plant and apparatus, and the capacity greatly enlarged, without materially adding to the capital outlay as compared with 1913, when it was £74,859, compared with £92,142 now. During the last two years, it was said by the Gosport Corporation, the consumers have contributed £39,816 towards the renewal and depreciation of the capital assets of the undertaking, and while they have on a former occasion protested to the proper authorities against the Company's practice of charging capital expenditure to the revenue account, they realize that money so contributed at the present time by the consumers to the betterment of the undertaking will in the long run react to their own advantage, unless the resources of the Company are frittered away upon schemes such as proposed in the present Order. The Council offered the most emphatic opposition to the acquisition of the Fareham undertaking, on the ground that it was opposed to the interests of their community, and did not arise

from any public necessity or demand. There is, the objection continued, no pretence of communal interest between Fareham and Gosport, which lie about six miles apart; and between the two areas there are vast stretches of open country, with no immediate prospect of development requiring the consumption of gas. The financial proposals regarding the transfer were also said to be extravagant, and in other ways objectionable. The amount was greatly in excess of the commercial value of the Fareham undertaking, and was further encumbered by large payments to the Directors and staff. It was submitted that it was quite unnecessary for the purchasing Company to pay the Directors of the selling Company any sum whatever. As to the Manager's compensation, while the Council did not demur to proper recognition of his past services, they submitted that the payment of a capital sum of £4500 was an unnecessary, expensive, and an erroneous method of bringing this about. Objection was also taken to the transfer of the unexhausted capital powers of the Fareham Company.

Mr. WILLIAM CASH (Auditor of the Gosport Company, and Chairman of a number of gas companies) gave evidence, and handed in a number of tables which bore out Mr. Abady's statement. As to the transfer of the unexercised capital powers of the Fareham Company to the Gosport Company, this was not unreasonable, having regard to the general conditions of the undertaking. Further, capital powers were not being increased in any way. The dividends actually paid by the Fareham Company from 1919 to 1922 were in excess of the authorized rate, but this arose from misapprehension in the minds of the Directors of the Fareham Company. If they had realized the position, no doubt they would have applied for an Order under the Temporary Increase of Charges Act. He pointed out, however, in extenuation, that in previous years the Company had paid less than they might have paid. The excess paid he estimated at about £1000. The price in Gosport was reduced to 10·8d. per therm on Jan. 1, 1924; and the price of 16d. in Fareham had been charged since July 1, 1923.

Mr. HARKER, on the question of the differential price in Fareham, said that the amalgamated Company would not be obliged to charge the consumers of Fareham the extra price, because one of the things in the general settlement in regard to the clause was that the word "may" should be substituted for the word "shall."

Witness, referring to the surplus assets mentioned, said that the Fareham Company had certain assets, consisting of stocks, debts, and cash in hand, and it had been found that the stocks were substantially more than was disclosed in the balance-sheet. Negotiations went on for a long time, as the Gosport Company had endeavoured to secure the undertaking at the lowest price. It was proposed to give the Directors ten years' purchase of their fees. He admitted that the more usual course was to give seven years, but there had been one or two cases where a higher sum had been allowed. In this particular instance the Director's remuneration had hardly been increased at all since the war, and the amount was not extravagant for a company of that size. Ten years' purchase had also been given to the Manager. The differential witness considered reasonable, because it was about mid-way between the present prices in Gosport and Fareham. The added charge for capital was one justification for charging a differential in addition to the greater cost of conveying gas to Fareham than to Gosport consumers. He then referred to a clause introducing a quarterly slide, which provided that the rate of dividend in any year should not exceed the average of quarterly rates for each quarter. A similar clause was inserted in the Ipswich Order last year. It removed the tendency for a company to say that there was no point in reducing the price of gas in (say) March, because they would not get anything out of it, and so leaving it until June.

Mr. WROTTESLEY, cross-examining, said that there was nothing to prevent the Gosport Company at any time charging exactly the same price in Gosport as in Fareham; and the Gosport Corporation objected to this.

Witness said there must be the higher price to the Fareham consumers for the period which must elapse before they got down to the agreed figure of 1·2d. After then the discretion ought to be with the Directors, for the reason that circumstances might arise at that time which would be such that the prices should be level. Such circumstances might arise from the growth of the outlying district.

Mr. WROTTESLEY held that there was nothing in the Order to provide that this discretion was only to be exercised in that way if circumstances did so alter. Counsel then went into the question of dividends paid by the Fareham Company in the past, in order to show that the Fareham shareholders would be doing pretty well out of the amalgamation, and said that, in addition to the £3200 cash, they would get fixed dividends and a substantially better security. It was his suggestion that the Gosport Company had not troubled much about the Gosport consumers.

Witness replied that the Gosport Company wanted to decrease the price to consumers in both areas, and make the concern a profitable one.

Mr. WROTTESLEY then put questions to the effect that, whereas on the date of the transfer the Fareham consumers would get an immediate reduction in price of 2·2d. per therm, there would be no corresponding reduction in Gosport.

Witness answered that the price in Gosport had been reduced in January this year, and, moreover, the advantage of the improved working following the amalgamation would also go to the Gosport consumers, who were in the majority taking the amalgamated area as a whole.

Mr. ABADY, in re-examination, referred to the fact that, under the Electricity Supply Act of 1919, there is a definite obligation to pay compensation to officers not taken over by one of the Joint Authorities provided for under that Act.

Witness also pointed out that there are similar provisions in the Acts dealing with the Port of London Authority.

Mr. ROWAND HARKER, speaking on behalf of the Southern Railway Company in regard to Clause 41 of the draft Order, which deals with the question of not being compelled to give a supply for other than domestic purposes where the capacity of the mains at the time of any application for an industrial supply is not sufficient to give this latter, said he understood that an endeavour was being made by the National Gas Council to agree a form of clause on this point with the railway companies generally, and he would be prepared to accept any such clause in lieu of the one appearing in the draft Order. As to clause 44, dealing with the right of the Gas Company to impose specifications as to minimum size and the material of pipes, Counsel asked that the form of clause in the Gas Light and Coke Company's order of 1922 should be inserted.

Mr. ABADY said the promoters were not prepared to agree to the insertion of the Gas Light and Coke Company's clause; but as there was the precedent, he did not feel that he could resist it, if the Board of Trade wished to insert it.

Mr. HONEY: We shall certainly do that.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market has again been upset by the dockers' strike. At the beginning of last week the shortage of tonnage began to be felt, owners being unwilling to send their boats if it could be avoided, for fear of their being held-up. The delayed settlement did not improve matters, but at the time of writing prospects appear brighter, and the tonnage position should rapidly adjust itself when normal conditions at the docks are resumed.

Shortage of tonnage, together with the continued feeble export demand for coking coal, has kept the whole market in a rather depressed state. With a limited outlet for coal, collieries and merchants have had to make price concessions in some cases. It may be that the supplying of arrears during the next week or two will stiffen things up, and inquiry for March and April is fairly satisfactory. But the lack of support for coking from France and Belgium points to increased quantities of reparation coal being forthcoming, and weakness in coking generally has an effect on all classes of Durham unscreened.

Current quotations for gas-works are 24s. 6d. to 25s. f.o.b. for Wear Specials and best qualities (Holmside, New Pelton class), and 23s. 6d. to 24s. for seconds. Best qualities are quoting 24s. 6d. for forward business. Good coking unscreened is as low as 22s. 6d. to 23s.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

All classes of gas coal are in good request in Yorkshire and Lancashire, and prices remain steady. There is still a strong demand for all kinds of house coal, particularly from the London area and the South, and prices are well maintained. The trade in industrial fuel also remains steady, and generally speaking collieries are well filled with orders. The export section is rather quiet, with not much sign of improvement while the Continental Exchanges are so greatly depreciated. Notwithstanding this fact there is very little coal available owing to the large demand at home.

COAL TRADE IN THE MIDLANDS.

From a Local Correspondent.

It is a long time since the market was so stringent as it is now. The supplies which accumulated in this district while the railway strike was on, and when London was cut off, have been cleared off, and now city merchants have the utmost difficulty in getting sufficient quantities from the pits to meet the calls made upon them. It is not that they are in competition with exporters; the root of the trouble is that the amount of coal raised is insufficient to go round. This position has recently been aggravated by the prevalence of influenza. At one Warwickshire colliery last week something like 70 men were absent from this cause, and reports from other districts tell a similar tale of short staffs and decreased output.

Gas coke is far from plentiful, and an advance in price to the extent of about 2s. a ton was perhaps what might be expected. A less insistent demand for furnace coke is reported from the Continent, which will go some way to ease home conditions in respect of supplies, and it may be in time in respect of price as well. Meanwhile, 28s. at ovens is about the average for supplies outside contracts which last up till the end of March.

Nuts and beans are described as "tight," and industrial concerns that have very small stocks have their anxious periods. Best house coal is in similar case. Prices are unchanged on the week, and are still above those ruling prior to the rail strike.

Wolverhampton Gas Company.—The accounts of the Company for the half-year ended Dec. 31 show that, after allowing for payment of interest on the debenture stock, there is a net profit of £20,048. To this sum has to be added the balance brought forward, making a total of £68,876. The Directors recommend dividends for the six months of 3 p.c. upon the preference stock, 5½ p.c. on the consolidated stock, and 3½ p.c. on the new ordinary stock, all less income-tax. They also recommended that a further £10,000 be placed to suspense account towards meeting the cost of replacement of plant; and that £1500 (part of undivided profit) be placed to reserve fund, leaving a balance of £49,317 to be carried forward. The Directors announce a further reduction in the price of gas (this being the third reduction during the last twelve months), to take effect from the reading of the meters for the Lady Day quarter, for domestic and general purposes from 9·5d. to 9·27d. per therm, for power and industrial purposes from 6·8d. to 6·57d. per therm, and through prepayment meters from 12 2½. to 11·7d. per therm. The installation of vertical retorts erected two years ago having proved successful and economical in working, the system is being extended; and considerable progress has been made with the work, which it is hoped will be completed in time to meet the heaviest demand for gas next winter.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Feb. 25.

There has been a slight increase in the price of pitch during the past week, owing to better demand. Solvent naphtha has also improved, and there is still a fair request. Other articles remain about the same.

The average values for gas-works products during last week were: Gas-works coal tar, 45s. 6d. to 50s. 6d. Pitch, East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 52s. 6d. to 55s.; Liverpool, 53s. 6d. to 56s.; Clyde, 54s. 6d. to 57s. Benzole 90 p.ct., North, 1s. 4½d. to 1s. 5d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 9d. to 1s. 11d. Toluole, naked, North, 1s. 4d. to 1s. 5d., nominal. Coal tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 2d. to 1s. 2½d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 8¼d. to 8½d.; salty, 8d. to 8¼d.; Scotland, 7¾d. to 8d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 2s. 1½d. to 2s. 4½d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Cleveland Gas Company.—The 98th half-yearly report of the Company states that during the past six months a profit was made of £1224. The Directors regret that, although the result is a considerable improvement on the corresponding period of 1922, this was nullified by a serious defalcation by a former member of the clerical staff, in respect of which the sum of £1231 had to be written off the accounts. The official had been with the Company several years, but the trust reposed in him had been misplaced. They propose that the credit balance of £1116 should be carried to the next half-year's account.

Narborough, Blaby, Enderby, and Whetstone Gas Light and Coke Company, Ltd.—The Directors state in their report to the shareholders that the past year has been the most successful in the history of the Company. The increase in the gas sent out was equal to 12·90 p.ct., but the sales of gas increased 23·98 p.ct., due to the great saving in leakage—the leakage account being reduced from 15 to 7 p.ct. There was also an increase in the gas made per ton of coal carbonized. Coke, tar, and sulphate of ammonia realized prices hitherto unattained, owing to much better yields in all the departments. The net profit for the year is double that of the previous year, which was a record. The Directors give full credit for the improved results to Mr. Eli Frost (the Engineer and Manager), whose energetic and systematic management is justified by actual results. The Directors recommend a final dividend of 2s. 6d. per share on the ordinary shares, making 10 p.ct. per annum, together with a further bonus of 2s. 6d. per share (equal to 15 p.ct. per annum).

Gas-Works Assessment Appeal.

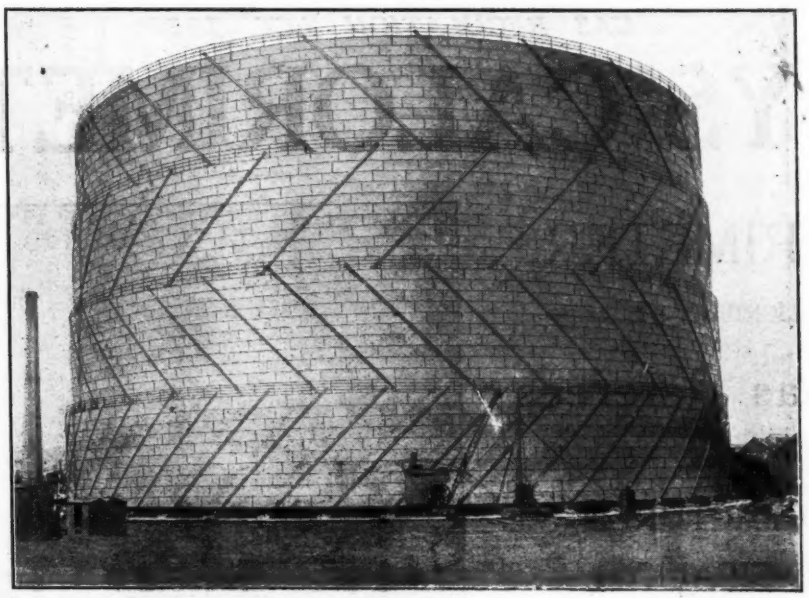
The Hemel Hempstead and District Gas Company have recently successfully appealed against the existing assessment on their undertaking in the several parishes to which it extends. In September last, the Company received a notification from the Valuer to the Hertford County Council that a re-valuation of the undertaking was about to take place, and, in consequence, they sought the advice of Mr. E. Howard Collins, who recommended the Company to appeal against the assessment in force. The necessary appeals were entered; and the result is that the Company have obtained a reduction in the assessment of slightly over 42 p.ct. on the figures upon which they had hitherto paid.

Birmingham Mining Students' Dinner.

There was a large attendance of mining experts and petroleum technologists at the annual dinner of the University of Birmingham Mining Students' Society, which was held on Feb. 20—Prof. K. Neville Moss presiding. The guests included Sir Robert Waley Cohen, K.B.E. (Chairman of the Anglo-Saxon Petroleum Company), Mr. W. G. Phillips (Chairman of the Warwickshire Coal Owners' Association), Mr. W. E. Lee, C.B.E. (Secretary of the Mining Association of Great Britain), and Mr. Herbert Barringer (President of the Institution of Petroleum Technologists). There were also present Sir John Cadman, K.C.M.G., and Dr. J. S. Haldane, F.R.S. (Director of Mining Research). Sir Robert Waley Cohen and Mr. Phillips, replying to the principal toast, dwelt upon the value of the universities in providing a steady supply of sound technicians, and urged the importance of a thorough grounding in scientific principles before technical specialization was embarked upon. "The University" was proposed by Mr. Barringer, and Sir John Cadman in response expressed his certainty that the University would do its part in maintaining close touch with the practical side of the Mining Industry. He voiced gratitude for the support given by the petroleum and coal mining organizations and companies. "The Mining Industry" was proposed by Dr. Haldane.

National Benzole Prices.—The National Benzole Company, Ltd., state that the current wholesale prices of "National Benzole" are 2s. per gallon in 2-gallon tins and 1s. 11d. per gallon in 50-gallon drums. "National Benzole" mixture is 1s. 8d. per gallon in 2-gallon tins and 1s. 7d. per gallon in 50-gallon drums. Scottish prices are 1d. per gallon additional.

Bacup Gas Company.—The half-yearly report of the Bacup Gas Company discloses a profit of £5148. There was an increase of 0·85 p.ct. in the sales of gas. Dividends are being paid as follows: On the original, new ordinary, and preferred shares, 10 p.ct.; on 1876 Act shares, 7½ p.ct.; on Amendment Act and New Amendment Act shares, 7 p.ct.; and on the new preference, 5 p.ct.



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Lurgan Gas Undertaking.—The accounts of the Lurgan Urban Council for the past year show that the gas undertaking receipts amounted to £20,544, and expenditure to £17,081.

Cork Gas Offices Robbed.—Two men armed with revolvers entered the offices of the Cork Gas Consumers' Company, held up the staff, and got away with £12 15s., which was all the cash on the premises at the time. The men were unmasked. The police are investigating the outrage.

Woking District Gas Company's Success.—The Woking District Gas Company, in competition with the Woking Electric Supply Company, have been successful in securing the contract for seven years for the whole of the street lighting. This will effect a saving to the ratepayers of £1300 per annum. The types of lamps to be adopted are Messrs. William Sugg & Co.'s "Littleton" and "Windsor."

Bromsgrove Gas Light and Coke Company.—At the meeting on Monday, the 11th inst., the Directors' report, which was approved, stated that on the year's trading there was a net profit of £1969. The balance brought forward was £2011. Dividends were recommended for the year of 10 p.ct. on the original shares and 7 p.ct. on the "B" shares, both less tax, leaving a balance to be carried forward of £2205. The Chairman (Mr. J. Green) stated that the large holder had been telescoped, doubling its capacity; and the new retort-house, which was to be extended, had been fitted with charging and discharging plant. Sanction was given by the meeting to the raising of £2000 of 5 p.ct. debentures.

Accidental Death from Gas Poisoning.—A verdict of "Accidental causes" was recorded at an inquest at Hammersmith on Victoria Cooper (44), a domestic servant, who was found dead in bed at Woodstock Road, Shepherd's Bush. Walter Coat said the woman asked him for a candle as the gas had failed. She could not put any money in the meter, as the door was locked in the kitchen. The Coroner remarked that the evidence pointed to the fact that the gas failed in the afternoon in the woman's room, when she turned on the tap. The landlady came home that night and put some money in the meter, and in that way had allowed the gas to escape in the woman's bedroom, and so caused her death.

Price of Gas at Seaham Harbour.—Complaints of the high price of gas were made at a meeting of the Seaham Harbour (co. Durham) Urban District Council. Mr. D. Sharvin remarked that gas companies expected a reasonable dividend; but when one came to consider the charge in Seaham and those in neighbouring districts, there was a great disparity. Seaham gas coal went to the Metropolis, and produced gas something like 36 p.ct. cheaper than it was made at home. In a town five-and-a half miles away the price was 2s. 2d. per 1000 c.ft., as against Seaham Harbour's price of 5s. 9d. With the pits close to the gas-works, he thought this ought not to be; and he therefore hoped the Gas Company would see their way to make a reduction in the price of gas.

The Largest Industry in New York City.—Under this heading, "Gas Logic" says that probably 6,000,000 or more individuals are dependent every day on the gas supplied by the Consolidated Gas Company of New York and Affiliated Gas Companies. It is estimated that the reproduction of the properties would involve the expenditure of at least $750,000,000. Federal, State, and Municipal taxes for 1922 (charged as a part of operating costs) amounted to $12,463,158, as against $9,840,077 in 1921. The Consolidated Gas Company of New York and their Affiliated Gas Companies in 1922 sold 374,434,823,500 c.ft. of gas. Costs for repairs and renewals in that year were $14,198,910, to ensure the maintenance of the gas and electric properties at the highest possible efficiency. It required 133,000,000 gallons of gas oil and 748,000 gross tons of coal to manufacture gas during the year 1922.

Shankiln Gas Company.—The accounts for the past year show a balance standing to the credit of the profit and loss account of £6556, subject to the payment of a dividend. The Directors recommend a distribution for the year at the rate of 7 p.ct., less income-tax. There has been an increase in the sale of gas of 1,648,000 c.ft. over the year 1922. The Directors have been able to announce a reduction equal to 9d. per 1000 c.ft. in the price of gas from the reading of the meters in December last. The purifying plant has been reorganized, and further extension of plant will shortly be required to meet the continuing increased sale of gas. The laying of a high-pressure main to Wroxall, which comes within the Company's area of supply, is being proceeded with, and gas will be available there at an early date. Negotiations were instituted in the early part of 1923 with a view to amalgamation with the Ventnor Gas and Water Company, but it is stated that they failed to mature.

The price of gas in Ardee (co. Louth) has been further reduced by 1s. 8d. per 1000 c.ft., making a reduction of 30 p.ct. in the past year.

The Bawtry and District Gas Company announce that from April 1 the price of gas will be reduced by 1d. per therm, equivalent to 5d. per 1000 c.ft.

The Thornton District Council have asked the Ministry of Health for sanction to borrow £1000 for the purchase of gas-cookers, to be let out on the hire-purchase system.

The Bingley District Council have decided to adopt automatic lighting and extinguishing of the street gas-lamps. The change-over to the automatic system throughout the district will cost approximately £4000. Pre-war lighting hours are also to be restored.

A quantity of tar in the retort-house at the Windsor Street Gas-Works, Birmingham, became ignited on Tuesday of last week, the flames spreading up to the roof and causing some damage. The brigade promptly arrived, and with sand and water the blaze was extinguished. The task was rendered difficult by the clouds of dense smoke emitted.

GAS REGULATION ACT, 1920.

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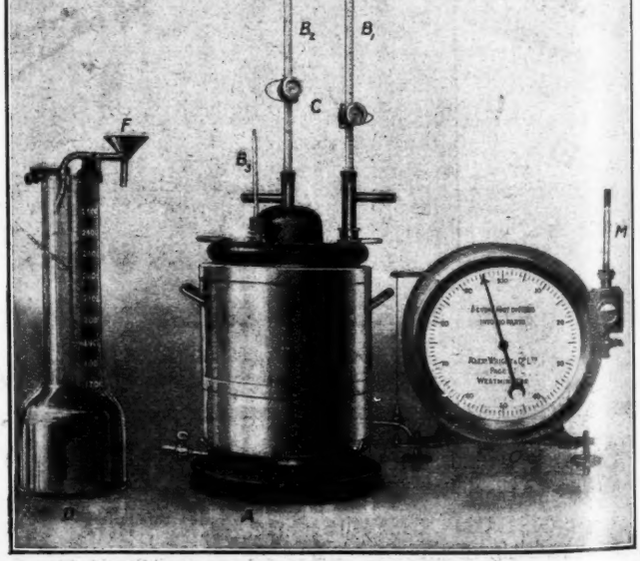

STOCK MARKET REPORT.

In spite of the uncertainty which prevailed as to an effectual settlement of the Dock strike, the sensational fall of the French franc, and the money stringency, it was remarkable that in most of the markets business was on the increase, and prices were consequently on the firm side.

There is little doubt that the financial policy of the present Government is being watched closely in the City, and a good impression was made by the Premier's announcement thereon. Although it was a foregone conclusion, the statement that the Capital Levy has been indefinitely postponed undoubtedly played a part in restoring confidence.

The week closed with substantially higher quotations compared with the previous week. War Loans rose $\frac{3}{8}$. Funding and Conversion Loans rose $\frac{3}{4}$, and other gilt-edged securities showed good improvements. Quotations were also maintained in the Foreign Market, with the exception of French issues. There was a good deal of business put through in the Industrial Market. Dorman Long shares were in demand as a result of the acquisition of the Sydney Harbour contract.

Gas companies' reports continue to be satisfactory, and, given fair treatment on any revision of the standard price, gas stocks should retain their stability and continue to be the safe investment they have always been. The changes in the quotations during the week, other than those quoted *ex* div. were: Falls—Continental Union ordinary 2 points, to 28-33, European $\frac{1}{2}$, to 6-7, Gas Light 4 p.ct. preference 1, to 60-63, and Imperial Continental 1, to 143-148. Rise—Primitiva 5 p.ct. preference, to $\frac{3}{16}$, to $1\frac{5}{16}$-$1\frac{13}{16}$.

The following transactions were recorded during the week: On Monday, European $6\frac{1}{2}$, $6\frac{9}{16}$, Gas Light and Coke $91\frac{3}{8}$, $91\frac{1}{2}$, 92, $92\frac{1}{2}$ *ex* div., 4 p.ct. preference $78\frac{1}{2}$ *ex* div., Hastings and St. Leonards 5 p.ct. 95, $3\frac{1}{2}$ p.ct. 80, Imperial Continental $145\frac{1}{2}$, 146, $146\frac{1}{2}$, $146\frac{3}{8}$, 147, Primitiva 8s., 8s. 3d., 5 p.ct. preference 33s. $1\frac{1}{2}$d., 33s. 6d., 33s. 9d., 34s., 34s. 6d., South Metropolitan $97\frac{1}{2}$, $97\frac{3}{8}$, $6\frac{1}{2}$ p.ct. debenture $104\frac{7}{16}$, 105, South Suburban 5 p.ct. 100, Swansea 7 p.ct. preference $102\frac{1}{2}$, $103\frac{1}{2}$, $6\frac{1}{2}$ p.ct. debenture $102\frac{3}{4}$, 103. Supplementary prices, Portsea Island 4 p.ct. debenture $72\frac{1}{2}$. On Tuesday, Aldershot 4 p.ct. preference $70\frac{1}{2}$, $71\frac{1}{2}$ *ex* div., Alliance and Dublin 69, Brighton and Hove original 178, British 122, Continental Union 30, European 6, $6\frac{1}{2}$, Gas Light and Coke $91\frac{1}{4}$, $91\frac{3}{8}$, 92 *ex* div., 4 p.ct. preference $77\frac{1}{2}$ *ex* div., Hastings 5 p.ct. $96\frac{1}{2}$, $96\frac{1}{2}$, Imperial Continental 145, Liverpool 7 p.ct. preference $106\frac{5}{8}$, Primitiva 8s. $1\frac{1}{2}$d., 5 p.ct. preference 33s. $7\frac{1}{2}$d., 33s. $10\frac{1}{2}$d., South Metropolitan $96\frac{1}{2}$, $97\frac{3}{8}$, $97\frac{1}{2}$, South Suburban 101, Swansea 7 p.ct. preference $103\frac{1}{2}$, Wandsworth 3 p.ct. debenture 57. On Wednesday, Alliance and Dublin $67\frac{3}{8}$, 68, Bournemouth 6 p.ct. preference $11\frac{13}{16}$, $11\frac{7}{8}$, Gas Light and Coke $91\frac{1}{4}$, $91\frac{3}{8}$, $91\frac{5}{8}$, 92 *ex* div., 4 p.ct. preference 79 *ex* div., 3 p.ct. debenture 58, 59, Hastings and St. Leonards $3\frac{1}{2}$ p.ct. 81, Imperial Continental 145, $146\frac{1}{2}$, Primitiva 5 p.ct. preference 34s., 34s. 3d., South Metropolitan 98. On Thursday, Aldershot 4 p.ct. preference $71\frac{1}{2}$, 72, Alliance and Dublin $68\frac{1}{2}$, Bristol 5 p.ct. max. $87\frac{1}{2}$, 88 *ex* div., Continental Union 29, 7 p.ct. preference 79, European 6, Gas Light and Coke $91\frac{1}{4}$, $91\frac{1}{2}$, 92. $3\frac{1}{2}$ p.ct. maximum 61, $61\frac{1}{2}$, 4 p.ct. preference 79, Imperial Continental 145, Montevideo 56, Oriental 102, $102\frac{1}{2}$, Primitiva 8s. 9d., 9s., 5 p.ct. preference 34s., 34s. 3d., 34s. 6d., 34s. 9d., 35s., San Paulo 6 p.ct. preference $5\frac{11}{16}$, South Metropolitan $94\frac{1}{4}$. 95. $95\frac{1}{2}$, $95\frac{3}{8}$ *ex* div., Wandsworth (Wimbledon Stock) $109\frac{1}{2}$. Supplementary prices, Brighton and Hove 7 p.ct. debenture $106\frac{1}{2}$, 107, Horley "A" $102\frac{1}{2}$, 103, Watford "A" 116. On Friday, Bombay $5\frac{1}{2}$, Brentford "A" $97\frac{1}{2}$ *ex* div., Bristol 5 p.ct. maximum $90\frac{1}{2}$ *ex* div., Cape Town $4\frac{1}{2}$ p.ct. preference $6\frac{3}{8}$, $4\frac{1}{2}$ p.ct. 1st mortgage debenture $75\frac{1}{2}$, Continental Union 28, Croydon maximum dividend 87, European 6, $6\frac{1}{2}$, Gas Light and Coke $91\frac{1}{4}$, $91\frac{3}{8}$, $91\frac{7}{8}$, 92, 4 p.ct. preference $77\frac{1}{2}$, Imperial Continental $145\frac{1}{2}$, Oriental $102\frac{1}{2}$, $102\frac{3}{4}$, Primitiva 8s., 5 p.ct. preference 34s., 34s. 9d., South Metropolitan 95 *ex* div., 3 p.ct. debenture $59\frac{1}{2}$, Tottenham "A" 120 *ex* div. Supplementary prices, Colombo $11\frac{1}{2}$, $11\frac{7}{8}$, Liverpool 5 p.ct. $87\frac{1}{2}$, 88.

In the Foreign Exchange Market the collapse and partial recovery of the French franc was the feature of the week, and, notwithstanding the drastic nature of the steps proposed by the French Government, confidence was not restored. For the first time the franc was quoted above 100; the highest point touched being 105.30. At the end of the week, however, there was a partial recovery, and it closed at 99.35. Many reasons have been advanced for the collapse; but it is obvious that the whole trouble is simply that the French Budget does not balance. The value of the sterling improved by reason of purchases in France.

As the week advanced the monetary position became easier, and better terms were obtained by the Government for Treasury Bills, the tenders averaging about 1s. 6d. p.c. below the previous week's rate of £3 10s. 5·71d.

The Indian demand for silver caused the price to rise, and the rate closed at $33\frac{9}{16}$d. for cash.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and $2\frac{1}{2}$ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Feb. 22.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Feb. 7	—	5	Aldershot 5 p.c. max. C.	..	70—75	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	68—73	70½—72
1,551,868	,,	Oct. 4	2½	5½	Alliance & Dublin Ord.	59—64	67—72	67½—69
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	Oct. 18	7½	8	Bombay, Ltd.	5½—6½	5—5½	5½
100,000	10	Aug. 9	—	8½	Bournemouth Gas and Water { 5 p.c. B 7 p.c.	..	12½—13½	...
583,110	10	,,	7	7		15—15½	12½—12¾	...
125,000	10	,,	6	6	Pref. 6 p.c.	13½—14	11—12	11 11/16—11 13/16
162,025	—	Dec. 28	—	4	4 p.c. Deb.	..	75—80	...
992,045	Stk.	Feb. 21	—	6 3/10	Brentford A Consolid.	..	96—101*	97½
734,920	,,	,,	—	6½	Do. B New	..	96—101*	...
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	89—94*	...
221,400	,,	Dec. 13	4	4	Do. 4 p.c. Deb.	91—93	76—81	...
214,745	,,	Aug. 23	11	11½	Brighton & Hove Orig.	208—213	175—180	178
244,200	,,	,,	8	8½	Do. A Ord. Stk.	154—159	127—132	...
1,287,500	Stk.	July 26	—	5	Bristol 5 p.c. max.	..	93—95⅛	87½—90½
855,000	,,	—	—	5	British Ord.	..	120—125	122
100,000	,,	—	—	7	Do. 7 p.c. Pref.	..	120—125	...
120,000	,,	Dec. 28	4	4	Do. 4 p.c. Deb. Stk.	88—90	73—78	...
100,000	10	,,	—	6	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Oct. 31	—	4½	Do. 4½ p.c. Pref.	4—6	6—7	6½
150,000	Stk.	Dec. 28	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	73—78	75½
237,860	,,	,,	—	7½	Cardiff 7½ p.c. Deb.	..	105—110	...
157,150	,,	Aug. 9	5	5	Chester 5 p.c. Ord.	108—110	85—90b	...
1,513,280	,,	July 26	5/9/4	6	Commercial 4 p.c. Stk.	106—108	92—97	...
360,000	,,	,,	5½	6	Do. 3½ p.c. do.	103—105	92—97	...
475,000	,,	Dec. 13	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	56—60	...
800,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	28—33	28—30
200,000	,,	Dec. 13	7	7	Do. 7 p.c. Pref.	115—118	78—83	79
660,000		Aug. 9	—	6½	Croydon sliding scale.	..	102—105	...
284,975		,,	—	5	Do. max. div.	..	85—88	87
492,270	Stk.	Feb. 21	6	4½	Derby Con. Stk.	123—125	108—110c*	...
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	74—76s	...
809,000	,,	—	—	5	East Hull 5 p.c. max.	..	..	...
1,002,180	10	Jan. 24	10	2	European, Ltd.	17½—18	6—7	6—6 5/16
16,546,120	Stk.	Feb. 7	4/17/4	5½	Gas { 4 p.c. Ord.	98—102	91—93	91½—92½
2,600,000	,,	,,	3½	3½	Gas { 3½ p.c. max.	76—79	60—63	61—61½
4,068,235	,,	,,	4	4	Light { 4 p.c. Con. Pref.	96—99	76—79	77½—79
4,761,930	,,	Dec. 13	3	3	and { 3 p.c. Con. Deb.	72½—74½	57—60	58—59
130,000	,,	Dec. 11	10	10	Coke { 10 p.c. Bonds	—	..	...
42,000	—	—	—	7½	7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6⅔	Hastings & St. L. 5 p.c.	..	93—98	95—96½
258,740	,,	,,	3½	5½	Do. 3½ p.c.	87—89	78—83	80—81
70,000	10	Oct. 18	11	10	Hongkong & China, Ltd.	16½—16¾	16—17	...
86,600	Stk.	Aug. 23	9	9½	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	Nov. 15	9	5	Imperial Continental	150—160	143—148	145—147
401,400	,,	Feb. 7	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	72—73*	...
235,242	,,	Aug. 9	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
4,127,340	,,	Feb. 21	—	5½	Liverpool 5 p.c. Ord.	—	8 1/16—8 3/16b*	...
600,000	,,	Sept. 19	—	7	,, 7 p.c. Pref.	..	105—108b	106½
165,736	,,	Feb. 21	7/5/6	8	Maidstone 5 p.c.	—	124—129*	...
63,480	,,	Dec. 28	—	—	Do. 3 p.c. Deb	—	54—59	...
75,000	5	Dec. 13	6	5	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	44—48	34—38	...
50,000	100	Oct. 1	4½	4½		99—101	95—98	...
541,920	Stk.	Nov. 29	4	4	Montevideo, Ltd.	..	54—59	56
1,875,892	,,	July 26	4½	4½	Newcastle & Gatsh'd Con.	98½—99½	86½—87½d	...
250,166	,,	Aug. 9	—	4	Do. 4 p.c. Pref. Stk.	..	74½—70½d	...
129,705	,,	Dec. 28	3½	3½	Do. 3½ p.c. Deb.	82—83	72—73d	...
15,000	10	Aug. 23	—	11	North Middlesex 10 p.c.	—	16½—17½	...
75,940	10	,,	7/14/0	7 7/10	,, ,, 7 p.c.	14—15	11½—12½	...
300,000	Stk.	Nov. 29	8	9	Oriental, Ltd.	117—122	97—102	102—102½
138,120	Stk.	Dec. 28	—	7½	Plym'th & Stonh'se 5 p.c.	—	105—110	...
60,000	50	Sept. 6	13	13	Portsea Island, B	128—131	105—110	...
100,000	50	,,	12	12	Do. C	118—121	100—105	...
1,450,345	5	29 Oct. 14	8	—	Primitiva Ord.	5½—6	⅜—½	8/—9/-
2,199,800	5	30 Dec. 15	5	—	Do. 5 p.c. Pref.	4½—5	1 1/16—1 3/16	33/1½—35/-
341,400	100	Dec. 3	4	4	Do. 4 p.c. Deb.	91—93	70—75	...
600,000	Stk.	Jan. 24	4	4	Do. ,, ,, 1911	—	54—57	...
320,535	,,	Dec. 28	4	4	Do. B. Aires 4 p.c. Deb.	85—87	55—58	...
321,670	,,	,,	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	55—58	...
130,000	10	Oct. 4	6	6	San Paulo { 6 p.c. Pref.	10½—11	5½—6	5 11/16
135,000	50	Jan. 2	5	5	{ 5 p.c. Deb.	47—49	37—40	...
270,000	Stk.	Aug. 23	—	5	Sheffield A	..	100—102s	...
419,968	,,	,,	—	5	Do. B	..	99—101s	...
1,047,000	,,	,,	—	5	Do. C	..	99—101s	...
233,201	Stk.	,,	4	6	Shrewsbury 5 p.c.	—	..	...
90,000	10	Oct. 18	9	6	South African	10½—11½	7—9	...
1,609,895	Stk.	Feb. 21	5/9/4	6½	South Met. Ord.	111—113	94—96*	94½—98
102,580	,,	Jan. 10	—	5	Do. Red. Pref.	—	98—100	...
1,895,445	,,	,,	5	5	Do. 3 p.c. Deb.	72½—74½	57—60	59½
734,000	,,	Sept. 6	—	6⅔	Do. 6½ p.c. Deb.	..	103—105	104 5/16—105
92,500	,,	Aug. 23	8½	8½	South Shields Con. Stk.	157—159	136—138d	...
1,087,795	,,	Feb. 21	6	6½	S'th Suburb'n Ord. 5 p.c.	114—116	95—100*	100—101
368,837	,,	Dec. 28	5	5	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
647,740	,,	Nov. 15	5	5	S'th'mpt'n Ord. 5 p.c. max	99—102	86—89	...
121,375	,,	Dec. 28	4	4	Do. 4 p.c. Deb. Stk.	..	74—79	...
250,000	,,	Aug. 23	—	7	Swansea 7 p.c. Pref. Stk.	..	102—104	102½—103½
200,000	,,	Dec. 28	—	6½	Do. 6½ p.c. Deb. Stk.	..	102—104	102½—103
120,000	,,	Feb. 21	—	8	Tottenham { A 5 p.c.	135—138	119—124*	120
882,375	,,	,,	6	6½	District { B 3½ p.c.	115—117	98—103*	...
181,355	,,	Dec. 13	4	4	{ 4 p.c. Deb.	87—89	77—81	...
258,251	Stk.	Aug. 23	5	5	Tynemouth 5 p.c. max.	108½—109	84—86d	...
30,000	,,	July 12	8½	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	132—137	...
255,638	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	110—115	...
108,075	,,	,,	5/17/3	6 5/10	Do. C	110—115	98—103	...
240,865	,,	,,	—	6 5/10	New Ordinary	..	—	...
152,000	,,	,,	6½	7½	Wimbledon 5 p.c.	117—122	105—110	109½
58,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	110—115	...
88,426	,,	Dec. 28	5	5	3 p.c Deb. Stk.	66—69	56—61	57

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *s.*—Sheffield. * Ex div.

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